Index

Engineering News-Record

Devoted to Civil Engineering and Contracting

McGRAW-HILL COMPANY, INC.

December 25, 1919

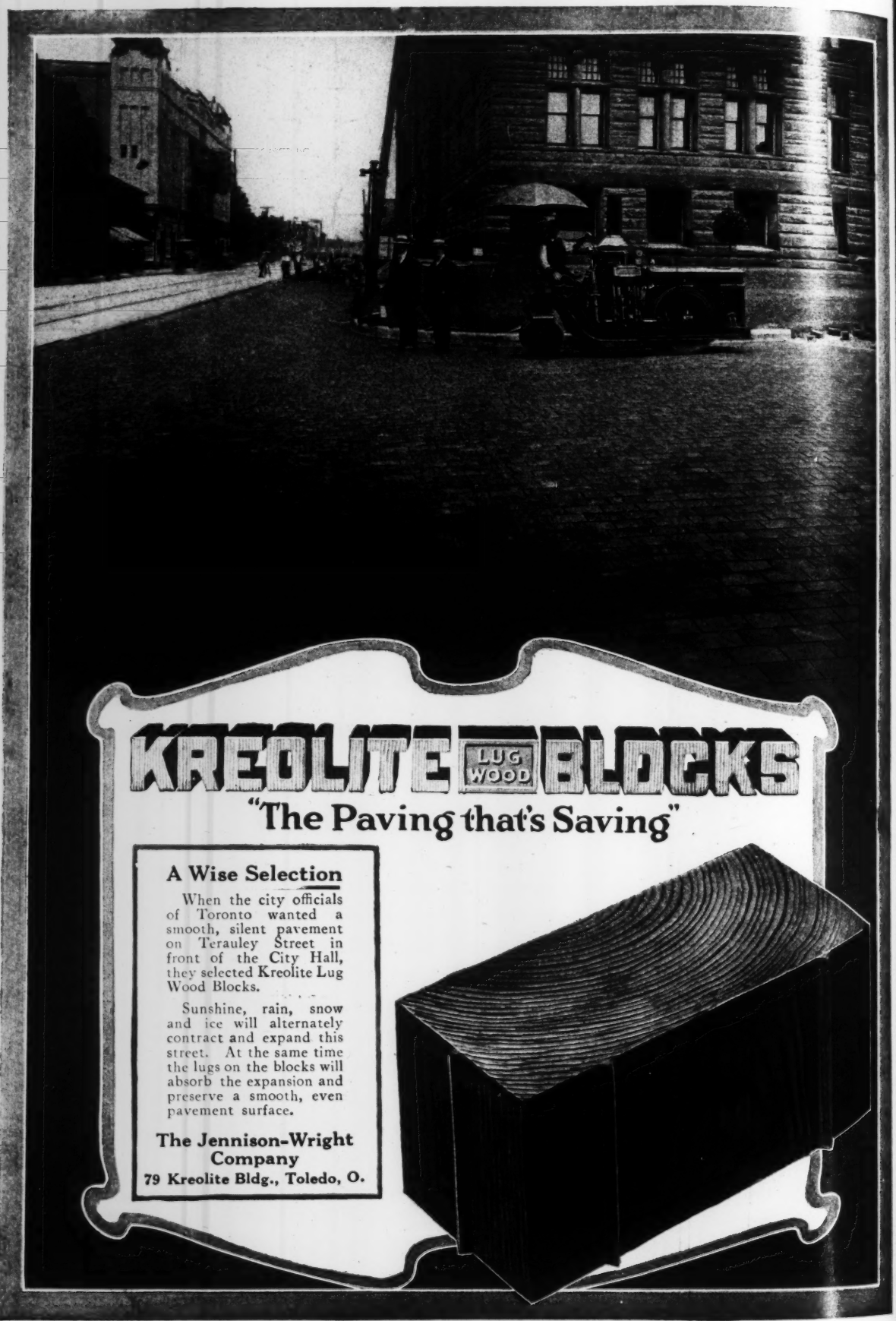
Merry Christmas

In time-honored phrase we send you the season's greetings. As the Yule-log crackles, figuratively or actually, on the family hearth, may the cares of the year take flight and a mellow brightness suffuse the future.

But even as we send you our greetings we realize that it has been difficult this year to catch the Christmas spirit. Yet we need to enter into it whole-heartedly. The world is awry, and our country, while indulging in an unprecedented orgy of extravagance, is torn by industrial strife. However idealistic it may sound in such a time, it is nevertheless true that the Christmas spirit of contentment and general good-will can be our only savior.

Can we catch this spirit of the Christmas season, and introduce it more largely into every phase of life?

Only so can we come to the true peace that is symbolized by Christmas Day.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ENGINEERING NEWS-RECORD

DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

E. J. MEHREN, Editor — CHARLES WHITING BAKER, Consulting Editor

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Faith and Good Works

WE HAVE discussed in another editorial the manifesto by 119 union heads, but have made no reference to their other action, condemning Bolshevism and the I. W. W. We are glad they made that declaration; it certainly expresses the views of the majority of unionists. But we shall await action in future difficulties to be sure that un-Americanism has been purged from the American Federation's leadership. We cannot at once forget the Boston policeman's strike and Fosters and Fitzpatricks who essayed to lead a strike in the steel trade. Professions of faith to be of any value must be backed by good works.

What Makes a Record

DOLLARS are a poor gage of value today; they are a much worse measure of amount of material. Yet professional statisticians persist in using them to indicate the trend of conditions. Only a few weeks ago the Geological Survey issued a bulletin stating that this country is exporting more cement than ever before. The headlines have been copied in many newspapers, where they are read by hundreds who never read farther and see that in amount the cement exports are lower than in any year since the war began and that the record is broken only in the dollars the cement costs. Similar misinformation is in a bulletin from a statistical firm which states that all building records in the East have been broken so far in 1919 because the contracts awarded— over $2,000,000,000—totaled some $700,000,000 more than ever before. Obviously, the actual construction—at the present high unit costs—must be much lower than the previous record. Statistics are misleading things at best. They are worse than useless if not handled judiciously.

What We Have Forgotten

AT THE annual meeting of the American Association of State Highway Officials in Louisville two weeks ago Col. William D. Sohier, for 11 years a member of the Massachusetts State Highway Commission, broke up the calm tenor of one of the discussions, in which a number of those present had outlined fields for research, by saying that many of the problems touched upon had been studied, and some of them completely solved, in the past. He was emphatic that the older litreature of highway building would shed much light on questions being, apparently, newly raised. With Colonel Sohier's point of view we have a very great deal of sympathy. There is a tendency in the states where highway work is new to turn up noses at the conservatism of Eastern commonwealths which doggedly hold to types of construction that the new men regard as obsolete. Yet we never associate with the men in the older states without being impressed with their thorough grasp of their problems. They speak with a certainty, and adduce supporting data, which one finds lacking in many parts of the country. There could be no greater service to the highway field at the present time than an openminded study of older practice. Certainly, we would find laid down there fundamentals, thoroughly proved by experience, with which many engineers are trifling—trifling, we believe, with certainty of waste of the public's money. In particular, a study of the older practice would have a salutary influence upon those who now give only superficial attention to the matters of drainage and sub-base.

Experience and Highways

WE HAVE had the good fortune for some years of being given the privilege of attending the normally closed meetings of the American Association of State Highway Officials. Year after year we have lamented the number of new faces which appeared, indicating the retirement, generally through political causes, of some experienced highway engineer. The successor might have been just as able, but the experience which the state had developed in his predecessor was largely lost. That thought came back to us more forcibly at Louisville this year than ever before. The number of new faces was, we are inclined to believe, somewhat less than at some of the previous conventions, but in the present situation far more alarming than such changes have been in the past. The highway engineers and officials of this country are facing the biggest responsibility that has ever been put upon a group of public officials in the expenditure of public funds. As Mr. Hirst pointed out in his presidential address, the expenditure on good roads during the next five years will probably be three or four times as much as was spent on our railway systems in their five palmiest years. For the proper discharge of this great responsibility we shall need not only ability but matured experience. It is a public responsibility of every engineer to see to it that "peanut" politics do not result in the discharge of able roads officials. It is equally a responsibility to see that the organizations are adequate in size and that the compensation is sufficient to hold in our highway organizations men able to assume responsibility for the tremendous highway expenditures that are ahead.

Promising Work on a Soil Problem

EARTH, the commonest material of engineering construction, is full of mysteries for the engineer. Each of its infinitely numerous varieties has many different physical properties, and the subject thus is remarkably complex. Of these properties, only a very few indeed have been explored or even made amenable to measurement. Under such circumstances, it is hardly necessary to point out that every added bit of quantitative information on soil properties is a distinct gain.

The dam-core studies which we have the privilege of describing in this issue promise to add much to our scant stock of knowledge on clays, and will for this reason be of high value to the development of engineering science. In their specific field they constitute a new departure, since they apply measurement in place of mere qualitative operation. They are likely to indicate laws of the action of supersaturated clay and supply numerical data directly serviceable in future construction. But at all events they will contribute toward creating a foundation of tangible fact on which a science of this particular material may ultimately be erected. There is the possibility, too, that the results will show that more is to be learned through studies of soils in their critical states than through investigation made under normal conditions; and if so, a new perspective will be opened in the investigation of soil problems.

Dam Cores and Experience

TEN years ago half a million cubic yards of the Necaxa dam, in Mexico, burst out of the confining slopes of the embankment in a flood wave. It cost a million or two of dollars to make good the loss entailed by this acident. Able engineers were in charge. And again at the Calaveras dam, in California, there were able engineers; yet here a still larger eruption of core clay took place, less than two years ago. Both accidents must be blamed essentially on the profession's utter ignorance with respect to the behavior of fine-grained clay soils of abnormal water content. When the dam-core measurements now begun are completed, though we will still lack knowledge of many phases of the subject, we are likely to have data that will enable us to avoid the recurrence of core slumping in hydraulic-fill dams. The history of the subject proves that this knowledge will represent a great many dollars saved in possible accidents. Not only shall we possess data on pressures in clay cores, and on rates of consolidation, but we may have the advantage of a practical showing that it pays to limit the fineness of the core material. Up to now the principle followed in the Miami dam construction of holding down the percentage of the extreme fines is purely an empirical judgment; the results of the pressure studies should give this principle a more definite grounding. They may also throw some light on the yet obscure question as to what extent, if any, a wet, semi-fluid clay mass of extremely fine grain is stiffened by having "plums" of coarse materials mixed with it, a question of some important practical possibilities.

Land Drainage and Federal Aid

FEDERAL aid has been so successful in irrigation that the vigorous advocacy of its application to land drainage is not surprising. The voices raised for Federal aid at the recent Drainage Congress were many and strong. Another viewpoint was shown by one who speaks with full knowledge of irrigation experience, Prof. F. H. Newell, former director of the Reclamation Service. He pointed out the small likelihood of any large drainage appropriations by Congress for some time to come, and warned against letting the hope of Federal aid deaden private initiative. The warning should be heeded. While Federal assistance may be needed for some large and difficult projects, there yet remains much work that can be done by private capital alone, or by it with state or county aid. To insure these smaller drainage works fitting into possible larger operations of later date, the Federal Government may well continue its comprehensive investigations. In these, the states, and in some cases the counties, may also join. The relatively small appropriations needed for such studies cannot reasonably be withheld by the most ardently tax-reducing Congress or legislature imaginable.

Engineers and Investment Securities

THE important relation of engineering to safe investments and the advisability of engaging consulting engineers to review plans for large projects were two points made in an address to the National Drainage Congress by Edward Bower, representing a firm which handles investment securities. He stated that when such a firm is considering the handling of the bonds of a drainage district the engineer's opinion is of equal importance with the lawyer's opinion and that unless the firm can rely upon the reports of the engineers it cannot afford to handle the securities. The engineering work must not only provide for adequate drainage of the district itself but must include consideration of adjacent territory in order that the specific drainage system may not become inadequate at some future time due to water delivered to it from adjoining districts.

In this connection he outlined the proper function of the consulting engineer, as distinguished from what may be called the practicing engineer. To quote Mr. Bower: "It is essential not only that the officers of the district shall employ reputable and competent engineers to create the drainage system itself, but that they shall employ also consulting engineers to act as an effectual check upon those actually doing the work. In any undertaking there is the possibility that those close up, because of their very nearness to the thing, may overlook some very essential factors which will be apparent to those who are more remote and for this reason may have a more general view of the situation. Further, this practice has a strong tendency to instill confidence in the minds of purchasers of drainage securities."

One would hesitate to endorse without qualification Mr. Bower's point of view of the need always of employing consulting engineers. It is conceivable that those called in on large projects will have the ability to survey the situation broadly as well as to work out the details. But as to the majority of projects Mr. Bowers is right. Those employed are likely to have relatively limited experience, and in such cases broader surveys by a consultant, both before and after the details are worked out should be sound investments.

The Unions' "Bill of Rights"

ON DEC. 13 the American Federation of Labor issued a statement on the rights of labor, which, because it is signed by the heads of 119 national and international unions, can be taken to express the views of the unionists of this country. One would expect such a manifesto to be a carefully considered document, laying down in studied form the basic doctrines of unionism and elaborating each to the extent needed to show their soundness. That, however, is not done, and one who approaches the declaration in the expectation of reading a searching analysis of industrial conditions and a dis-

cussion of the unions' industrial function will be disappointed. The statement is referred to as a "bill of rights." That, in a measure, describes it, for it is devoted very much to rights but very little to the responsibility which goes with those rights.

The manifesto is essentially a fighting document, concerned mainly with the issues of the moment. In its fervor it attacks whatever is in labor's way, without a weighing of what is sound and good and what is wrong. We read with sympathy their exposition of the function of the strike, but cannot accept their view that the right to strike shall under no conditions be abridged. We sympathize with their protest against "government by injunction," but object to their condemnation of the accepted function of the judiciary to pass on constitutionality—that salutary check against precipitate action. We agree that the unions have been "agencies of human progress," but cannot agree that they must be above conspiracy and anti-combination laws.

In some respects, though, the document bears evidence of a groping after a broader conception of industrial economies. There is a call for coöperation between the "scientists of industry" and organized workers, there is a demand for public control of credit, there is a recognition that the creative powers of the workers must be released. It must be coming home to some of the Federation's leaders that they are tyros compared with the leaders of British unions. Possibly they see that only by getting a sound conception of industry can they develop further. At any event, here is new thinking in American unionism.

Part of this new thinking is well expressed. We find, for example, these words:

"Creative power lies dormant when autocratic management prevails. No employer has a vested right to the good-will of his employees. That must be earned as between men. It can be earned only when management deals with workers as human beings, and not as machines. There cannot be a full release of productive energy under an autocratic control of industry. There must be a spirit of coöperation and mutuality between employers and workers."

Sound doctrine that. But before we have had time to allow it to sink in we find, closing the very same paragraph, these words, "we submit that production can be enhanced through the coöperation of management with the trade-union agencies, which make for order, discipline and productivity."

The facts do not warrant that statement. We have never failed to admit the need for the union movement, but we have not blinded ourselves to the fact that in stimulating production it has consistently failed. Rather, its influence has been to restrict production.

Right here, too, is where the federation must make a strong attack. Right here—on the matter of production—it wants to stop and write a strong "bill of responsibilities" to go with its "bill of rights." Such a "bill of responsibilities" on production would do more for union standing than anything we know.

The much-heralded manifesto, then, has been a disappointment. It contains glimmerings of broadened thinking, but by and large it is a mixture of strong truths and woeful errors. It is a "bill of rights" that ignores responsibilities. In some respects it is hopeful; in most, too much reminiscent of the unreasonable and unreasoning fighting spirit of the immediate past.

An Object of Suspicion

IT HAS become the custom when a controversy is brought to judicial notice to close all avenues of information lest there result public discussion which would prejudice the issue. Probably one of the parties to a suit may benefit from such an embargo, but in matters of a public nature other interests than the litigants' must be served. Such is the case with the Chicopee standpipe, discussed on another page. The questions of public welfare and policy involved rise superior to the petty claims of the officials of Chicopee, or of the builders of the standpipe, neither of whom will give out necessary information on which to base a fair judgment.

There is nothing novel in the method by which the Chicopee standpipe was contracted for. Probably most of the tanks and standpipes in the country have been let by nontechnical city officials to builders who also design the structure and who build it without the advice or supervision of any engineer outside of their own employ. Nevertheless, the custom is vicious. Public safety demands some surer protection than a manufacturer's reputation, when that manufacturer must produce a design of minimum price and amount of material. His idea of the chances he can take and the ideas of those who do not profit by the contract may be far apart.

The issue at Chicopee is not so much the design of this standpipe or its immediate danger to the community, but that obstacles have been put in the way of finding out whether it is weak or not, and that no official seems to think the situation calls for expert, unprejudiced advice. On the one hand we have a commercial design backed by an established company of good reputation, but a design made in price competition, and on the other hand the voluntary criticism of an outside engineer based on casual inspection of some elementary drawings and on conclusions reported to him by other engineers who made a more careful study of the design and specifications on which the contract was let. Between the two is a city government quite incapable of judging the technical merits of the case. With this doubt thrown on the design, the city should have been quick to make a public investigation. If the standpipe was safe, the critic would have been silenced and discredited; if his criticisms proved valid, the city and the citizens would have been safeguarded. Instead, however, the city proceeded with the contract, though there is every reason to believe that it was warned regarding the original design by some insurance interests which it consulted privately. Worse than that, it continues tacitly to defend the design by refusing to aid any independent investigation of its nature.

We make no definite criticism of the Chicopee standpipe as built, because we have not been able to learn the exact details of the structure. In the tank as designed, and apparently as built, the base shell tension is nearly 21,000 lb. per square inch, assuming a 70% rivet efficiency which, from a view of the structure, could hardly be surpassed. The rivet design will bear looking into, and the reported designs of the foundations are radical enough to attract the attention of a specialist. If the structure had been designed and contracted for in an open fashion, and if the details were now open for inspection, the standpipe would still be an object of interest to engineers because it is one of the record structures of its type. Enveloped as it is in a cloud of secrecy, it is an object of suspicion.

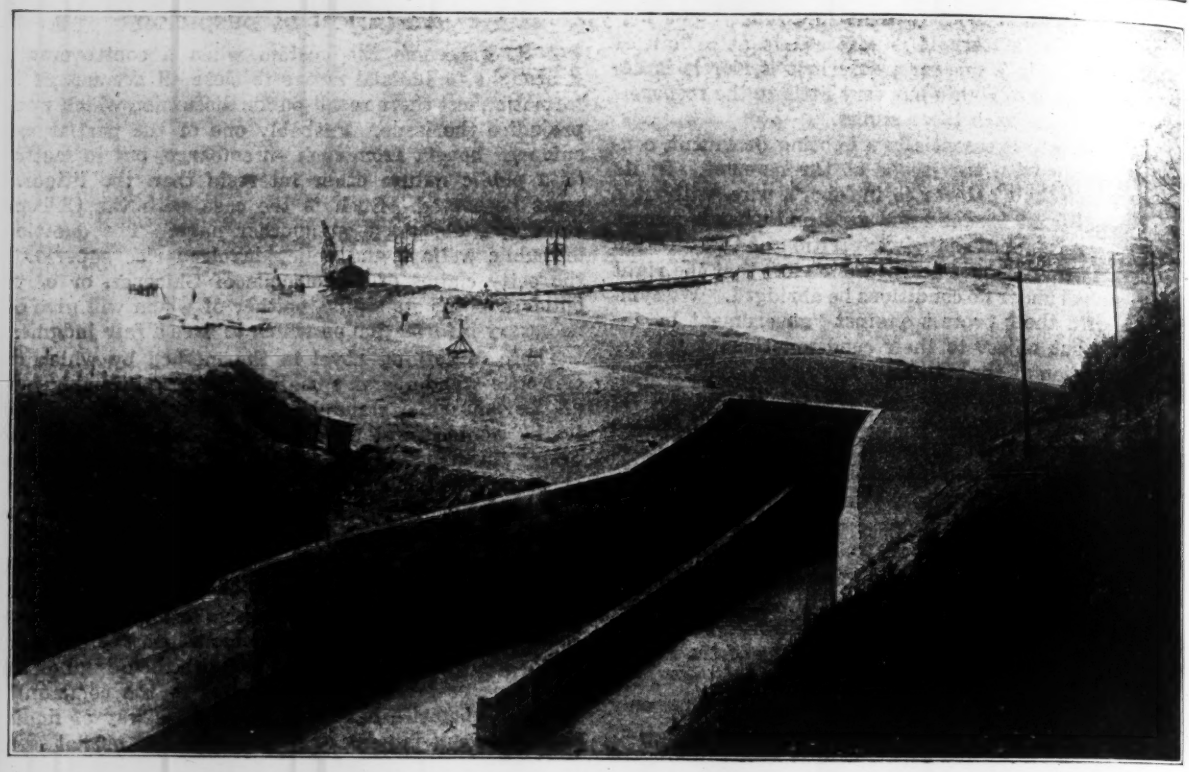


FIG. 1. GERMANTOWN DAM AT THE BEGINNING OF NOVEMBER; VALLEY CLOSED AND ENTIRE EMBANKMENT UP TO 1898 FLOOD-CAPACITY LEVEL. TOWERS FOR CORE STUDY NEAR FAR END, OVER BED OF TWIN CREEK

Study of Pressures in Hydraulic Dam Cores

Methods of Miami Conservancy Engineers To Obtain Data on Core Consistency and Action—Ball Soundings—Measurements of Lateral and Vertical Pressures—Results to Date on Germantown Dam

TO OBTAIN definite information on the solidifying action in their hydraulic dam cores, a subject surrounded with much uncertainty, the engineers of the Miami Conservancy District have initiated a system of tests that should not only serve as a safety control in the construction of the five flood protection dams now being built by the district, but also yield useful data for guiding future work. The large-scale slumping of the Necaxa and Calaveras earth dams within the past ten years emphasized forcibly the risks residing in persistent fluidity of a water-deposited clay mass.[1] Little or nothing is known as to best composition of core material (in grain size), rate of solidification for variously graded cores, and suitable method of testing solidification. The most directly valuable results of the present studies at the Miami Conservancy dams are likely to be those bearing on the last-named question, since pressure-cell observations are being made for the first time. Further, a close check will be secured on the merits of the grading limits selected for the Miami dam cores, which are made of distinctly coarser material and include a larger range of sizes than that of the Calaveras dam, for example.

The work is the sequel of pressure-cell experiments which the district had made for it by A. T. Goldbeck, of the Office of Public Roads at Washington; preliminary results of these experiments were reported in *Engineering News-Record* of April 18, 1918, p. 758. Pressure cells of the type developed by Mr. Goldbeck are being built into the core of each of the five dams, at various depths, and monthly readings of lateral and vertical pressures will be made. The farthest advance has been reached at the Germantown dam, where eleven cells are in place and results are being accumulated.

In addition to the cell gagings, ball soundings of the core are carried on, and frequent analyses of core material are made, thus rounding out a valuable set of checks. Finally, at three of the dams, where vertical shafts have been built into the backs of the outlet-structure retaining walls to take care of the overflow from the hydraulic pool, it is planned to use these shafts for examining the interior of the core.

Limiting The Core Width

To explain the engineering views involved in the Miami core construction, two important matters must be noted. Study of slumping in earth dams, especially the Necaxa dam, led the engineers of the Conservancy District to the conclusion that safety requires the width (and hence side slopes) of the core to be limited rather closely. This opinion was strengthened by later studies of the Calaveras slip. Their conception of the wide core, shown in the upper sketch of Fig. 2, is that

[1] On the Necaxa dam slip, see J. D. Schuyler in *Engineering News*, July 15, 1909, p. 72. On the Calaveras slip, see Allen Hazen and Leonard Metcalf in *Engineering News-Record* of April 4, April 11 and Dec. 26, 1918, pp. 679, 704 and 1158.

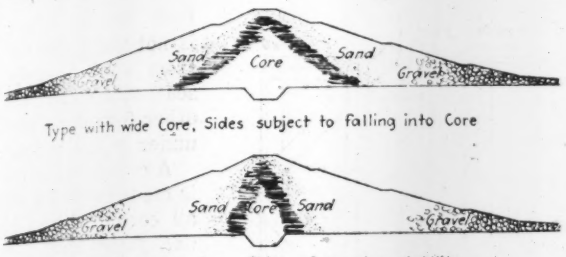


FIG. 2. DIAGRAMS ILLUSTRATING RELATION OF WIDE AND NARROW CORE TO STRENGTH OF DAM

the overhang of the outer banks is likely to be supported in rather unstable fashion on the semiliquid upper portions of the hydraulic core, and that this may lead to (1) caving of the banks inward; (2) extension of the soft core by the production of lubricated and hence mobile material in the banks, and (3) ultimately a

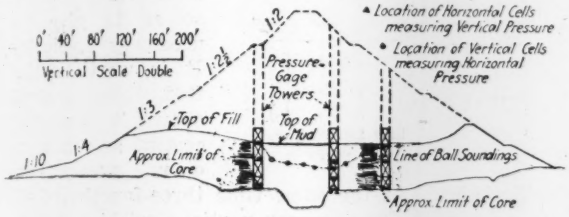


FIG. 3. POSITION OF TOWERS AND PRESSURE-CELLS, GERMANTOWN DAM (SKETCH SHOWS CONDITIONS OF NOV. 14, 1919)

bursting out of the core either causing or caused by a slip of the weakened bank.

With this in mind, they fixed the rule that the cores should nowhere be wider than the final dam height above the point in question (see right hand sketch in Fig. 2). This requires the hydraulicking to be conducted with a narrow pool and gives an ample section of stable, coarse material (grading out to coarse gravel) on either side, but it proves entirely workable if the fines in the material are kept down to a suitably low percentage (Germantown) or if the surface drain from the pool is so handled as to carry out the excess of fines (Taylorsville). The resulting core, with side slopes of approximately ½ : 1, is believed to be amply wide for tightness and not likely to induce caving of the bank along the contact.

Under this rule the base width of the core is only slightly over 100 ft. in any of the dams. This is usually less than one-fifth of the dam base. The great width of outside bank so obtained is an added element of strength. Further, consistent effort is being made to obtain a good gradation of sizes in these outside banks, from cobbles and coarse gravel at the outer slopes to fine gravel and sand next to the core.

During the preliminary examinations of material suitable for dam construction, the District conducted soil investigations by borings and test pits in the vicinity of each dam site. These investigations gave the necessary information as to percentages of gravel, sand, and clay present in the available material, and enabled the engineers to determine which of the available borrow-pits would come nearest to giving the desired proportions of coarse and fine materials in the dam. As to the grading of the fine, or core, materials, this required apparatus not available at the District laboratory, but the Bureau of Soils at Washington, D. C., made several analyses of these core materials for the District. So that before the work started, the Conservancy engineers had obtained considerable information as to the probable behavior of the available materials in a hydraulic-fill dam.

In order to avoid excess of fine material in the core, the mechanical analysis of the pumped material was so defined as to limit both the percentage of core material in the total and, to a certain extent, the percentage of "silt" and "clay" in this fraction. The core percentage is fixed by the cross-section of the dam.

The limitation of fines in the core material was largely a matter of judgment, based on analyses obtained of core materials available, and samples of core secured from other hydraulic-fill dams. This question was also influenced by the results of the pressure measurements made for the District by the Office of Public Roads. A standpipe 30 in. in diameter by 41 ft. high, was filled with a pumped sand-clay mixture, pressure cells being placed in it at various elevations. Leakage of water being prevented, consolidation of the material depended on settlement alone, as is thought to be very much the case in a hydraulic dam core. While friction along the sides of the tank undoubtedly influenced the readings, these experiments showed conclusively, first, that the Goldbeck apparatus is suitable for use in hydraulic-dam cores under conditions encountered during construction, and second, that the core material in a dam acts as a perfect fluid during the earlier stages of settlement, but gradually loses its fluid properties as consolidation proceeds.

Another very important fact was suggested by the results of these experiments, namely, that consolidation in the hydraulic dam core may be considerably accelerated by wasting the very finest of the material, which otherwise is held in suspension for a long period.

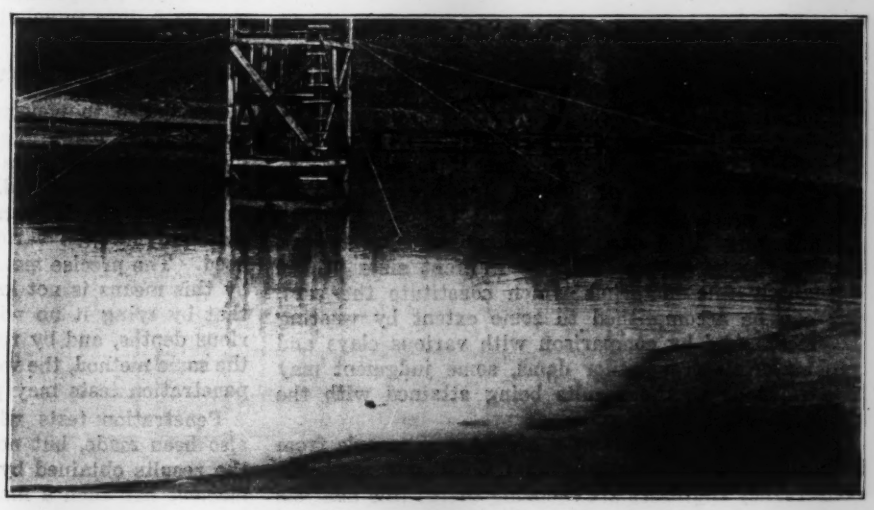


FIG. 4. GAGE TOWERS IN GERMANTOWN CORE POOL

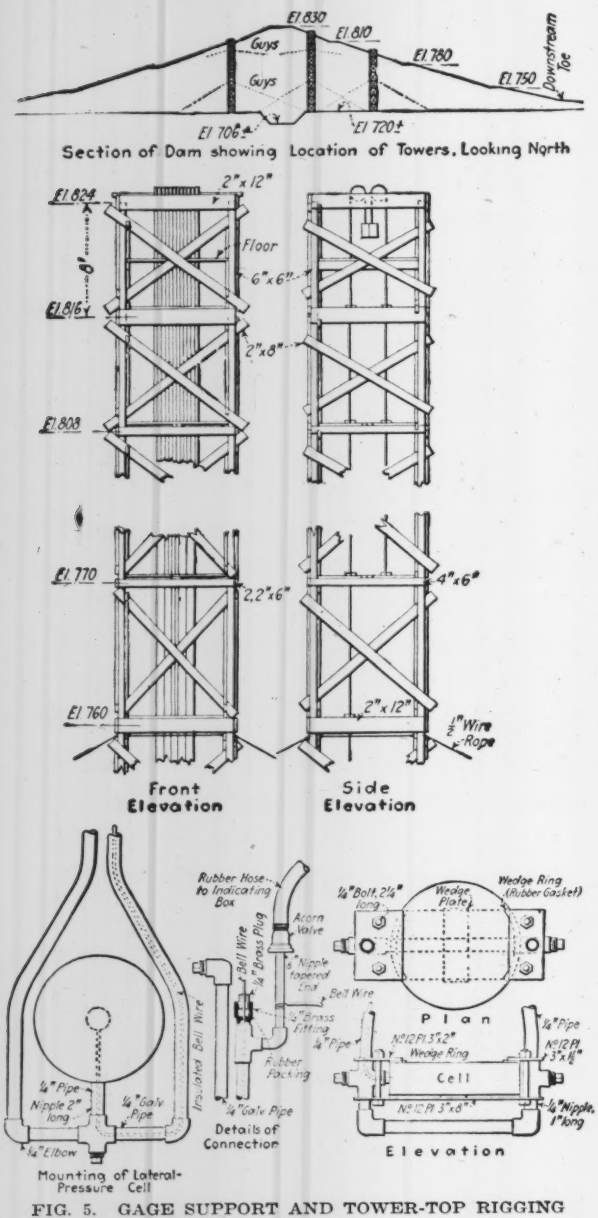
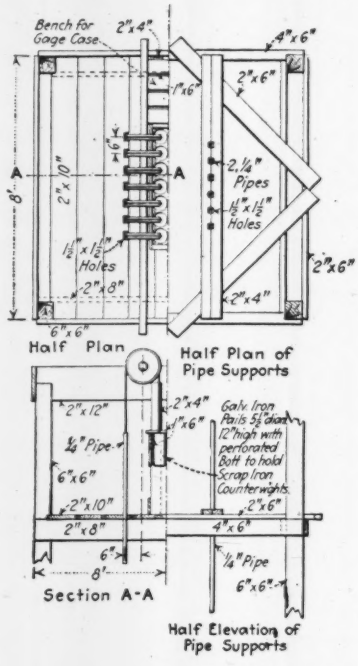


FIG. 5. GAGE SUPPORT AND TOWER-TOP RIGGING

This could not very well be accomplished with the experimental tank, but is very readily accomplished in ordinary hydraulic dam construction. The experiments indicated further that although consolidation of core material is very slow, it does proceed rapidly enough (judged by decrease of lateral pressure ratio) for safety in construction.

While very little can be done on any job toward varying the percentages of the different sizes of the exceedingly fine materials which constitute the core, this can be accomplished to some extent by wasting the fines. And by comparison with various clays and core materials from other dams, some judgment may be formed as to the results being attained with the materials available.

The following analysis of a dipped core sample from the pool of the Taylorsville dam illustrates what the Conservancy engineers are securing there; this analysis



(see table below) is not very different from similar analyses made at the other four dams now under construction.

A consistent effort is made to hold down all core material to *not finer* than the analysis given. At Taylorsville the material available at present is higher in silt and clay than desired, and control is obtained by wasting fines through the pool drain pipe, its level being lowered so as to give the necessary velocity. It is worth noting that the analysis shown is finer than cement as made under present-day specifications. At the same time three-fourths of the fines consist of the coarser particles within the size range, whereas in some prior hydraulic-dam work the clay percentage greatly overbalanced the silt percentage,

SAMPLE ANALYSIS OF TAYLORSVILLE CORE SAMPLE

Bureau of Soils Standard Grade Name	Size of Particles	*Taylorsville Sample* Per cent by Weight	
Fine gravel	2-1 mm.	0.0	
Coarse sand	1-0.5 mm.	0.0	
Medium sand	0.5-0.25 mm.	0.1	
Fine sand	0.25-0.1 mm.	1.0	
Very fine sand	0.1-0.05 mm.	18.1	
Silt	0.05-0.005 mm.	59.7	Fines 80%
Clay	0.005-0	20.2	

producing, it is thought, a much more mobile material. While conceding that no definite data are yet available to determine the ideal mechanical analysis of core material, the Miami Conservancy engineers believe that at present they are working on the safe side, and believe that their tests will promptly reveal any undue softness of core or failure to solidify (in terms of drop of lateral-pressure ratio).

Penetration Tests

Resistance to penetration, or supporting power, of dam cores is being gaged by lowering a 6-in. cast-iron ball into the pool by a rope, its penetration under its weight being recorded. This method of gaging was introduced at Calaveras and supplies a comparison standard between various dams on which it has been used. The precise meaning of the penetration obtained by this means is not known at present, but it is hoped that by tying it up with pressure-cell readings at various depths, and by results obtained at other dams by the same method, the work involved in carrying on these penetration tests may prove to be worth while.

Penetration tests with iron and wooden rods have also been made, but no particular value is attached to the results obtained by those methods, as the personal element has such a marked effect on the results. The

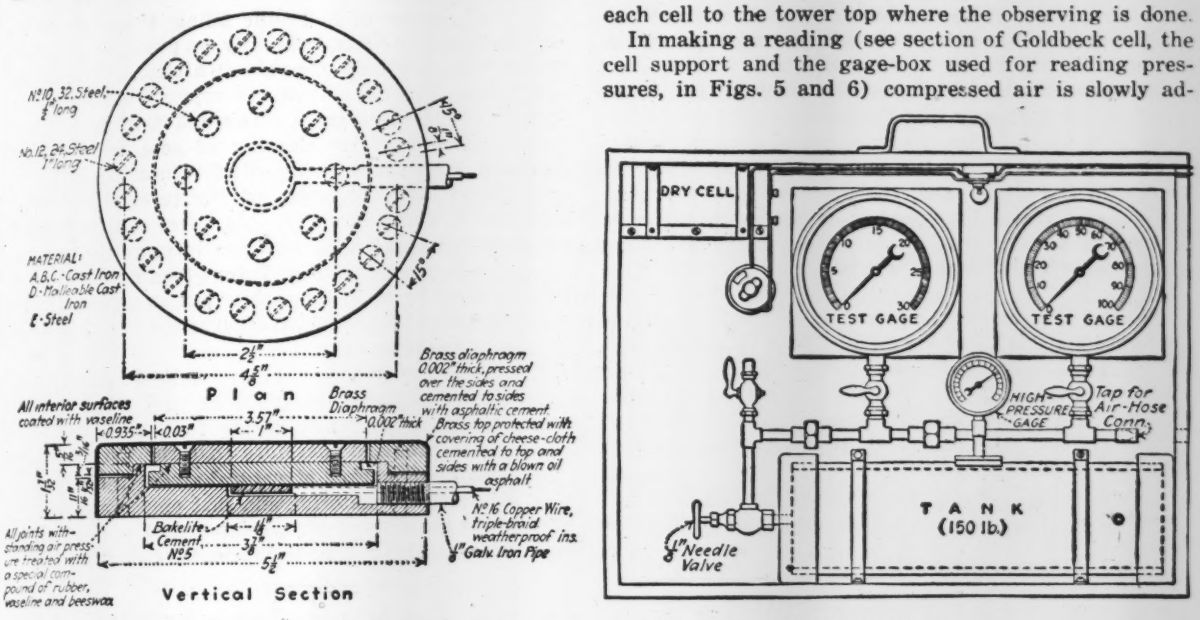

No 10, 32 Steel, 1/2" long
No 12, 64 Steel 1" long
MATERIAL:
A, B, C - Cast Iron
D - Malleable Cast Iron
E - Steel
Plan
Brass diaphragm 0.002" thick, pressed over the sides and cemented to sides with asphaltic cement
Brass top protected with covering of cheese-cloth cemented to top and sides with a blown oil asphalt
All interior surfaces coated with vaseline
Brass Diaphragm 0.002" thick
No 16 Copper Wire, triple-braid weatherproof ins.
1" Galv. Iron Pipe
Bakelite Cement No 5
All joints with-standing air pressure treated with a special compound of rubber, vaseline and beeswax
Vertical Section
DRY CELL
TEST GAGE
TEST GAGE
HIGH-PRESSURE GAGE
Tap for Air-Hose Conn.
TANK (150 lb.)
1" Needle Valve

FIG. 6. GOLDBECK PRESSURE-CELL AND INDICATING-GAGE BOX

ball tests are much more definite, and, it is believed, will yield data of some value.

PRESSURE-CELL TESTS

From the Washington tests already mentioned, the inference was drawn that the Goldbeck cells would give reliable information as to the lateral pressure existing in hydraulic-dam cores, and that the relation of vertical to horizontal pressures, recorded by these cells, would portray truly the increasing angle of repose or growing solidity of the core material. Basing on this, the decision was reached to bury similar pressure cells in the dam cores at 10-ft. vertical intervals in order to obtain a full record of the progressive change of nature of the material. The Germantown arrangement represents the test system, as sketched in Fig. 3.

There are three light wooden towers (Fig. 4) erected at three points across the width of the core near the place of lowest foundation. Pressure cells are hung within these towers by wires counterweighted over sheaves at the top (Fig. 5), permitting any cell to move down with the surrounding soil as this settles; the cells are not held laterally. In the middle tower lateral-pressure cells will be set at 10-ft. intervals, and vertical-pressure cells at 30-ft. intervals; in the other towers the corresponding intervals will be 20 and 40 ft. An air-pipe, containing also an electric indicator wire, rises from each cell to the tower top where the observing is done.

In making a reading (see section of Goldbeck cell, the cell support and the gage-box used for reading pressures, in Figs. 5 and 6) compressed air is slowly admitted to the pipe leading to a cell, until the contact buttons in the cell separate, as indicated by the dimming of a miniature lamp whose circuit goes through the buttons. The pressure at this moment, read by gage, indicates the earth pressure. The portable gage-box contains a small air tank, three dry cells, a 3-volt lamp, and wire and hose connections. In using it, the lamp can be lighted and extinguished repeatedly with identical results, which tends to show that the movements of the pressure-cell diaphragm do not disturb the soil conditions.

During the past two months four sets of readings

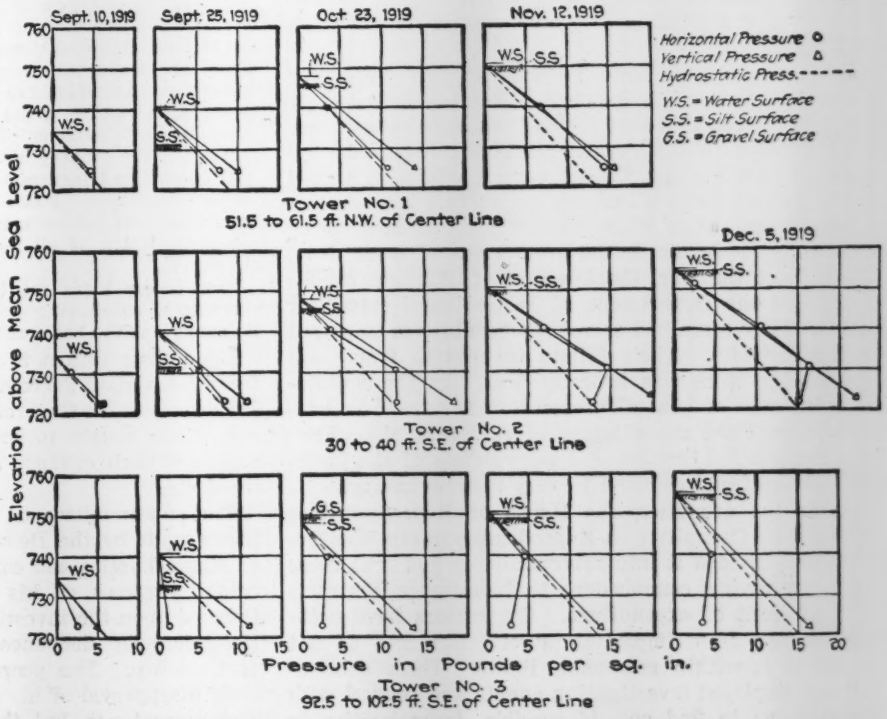

Sept. 10, 1919
Sept. 25, 1919
Oct 23, 1919
Nov. 12, 1919
Horizontal Pressure
Vertical Pressure
Hydrostatic Press.
W.S. = Water Surface
S.S. = Silt Surface
G.S. = Gravel Surface
Elevation above Mean Sea Level
Tower No. 1
51.5 to 61.5 ft. N.W. of Center Line
Dec. 5, 1919
Tower No. 2
30 to 40 ft. S.E. of Center Line
Pressure in Pounds per sq. in.
Tower No. 3
92.5 to 102.5 ft. S.E. of Center Line

FIG. 7. PRESSURE CURVES OF GERMANTOWN CORE

have been taken at Germantown. The curve-sheet Fig. 7 gives the results. It will be seen that the downstream tower is showing a sharp drop in lateral pressure, not consistent with the readings at the other towers. There is reason for believing that the lowest cell of this downstream tower has become surrounded by gravel and sand from the toe of the embankment confining the pool. On the other hand, the upstream tower may be affected by gravel interference as the work proceeds. These two towers are located purposely in the zones (between core and banks) where such action might occur.

The middle tower, however, is without doubt in true core material, and the distinct drop in lateral pressure at the lower gage is held to show decided solidification at depths of 20 to 30 ft.; the pressure ratio for this reading is 0.6, and the lateral pressure is down to the hydrostatic head. It is interesting to note that the readings of Nov. 12 show no increase of pressure on the lower cells, although both water surface and top of core were higher on that date than on Oct. 23.

In the progress of hydraulic filling, the edges of the pool shift more or less constantly, as pumping usually is carried on along only one side at a time. This results in variations in core width, as represented by the irregular outline in Fig. 2. Through this variation, a certain amount of interleaving of core and banks is produced, which may easily affect records of individual cells placed near the edges of the core. When many cells are in place, however, this effect can be detected by comparison and such readings interpreted by themselves. The curves of Fig. 7 are given here not as especially significant in themselves but as suggesting the possibilities of the extensive observation series of which they are the beginning.

A satisfactory phase of the hydraulic-fill work is that immediately adjacent to the core pool a sand beach forms which is very firm to the foot, even in a hard rain. It is probable therefore that the dam structure has material of marked structural strength close alongside the soft core material, and that only a narrow zone just inside the water's edge, composed of sand combined with fines, is likely to be in lubricated condition.

Congressional Persecution of Contractors and Manufacturers

By William B. King
Of King & King, Attorneys and Counsellors at Law, Washington, D. C.

THE work done by the engineering contractors and manufacturers of the United States during the world war will be recorded as one of the greatest industrial accomplishments in history. Cantonments sprang from nothing in an incredibly short time. Factories were swiftly transformed from purposes of peace to those of war and functioned efficiently without delay. European records of quantity production were promptly exceeded. Engineers and administrative officers adapted themselves to new tasks with a characteristic American readiness.

Some waste and some inefficiency were necessary accompaniments of this speed. Before the event it would have been said that it could not have been accomplished without a considerable amount of dishonesty and fraud. There was some waste, some inefficiency, a good amount of lost motion between contractors and Government officers, but so little dishonesty or fraud as to be practically negligible in the great mass of work done. Throughout the war, the Division of Military Intelligence and the Department of Justice were extremely active. They often had secret representatives employed in the factories. Their failure to unearth fraud was because the work was honestly done. In the conspicuous instance of general prosecution for fraud in connection with the manufacture of raincoats, the wholesale charges fell through and the verdicts of the juries showed the fraud confined to very narrow quarters.

After the armistice, the House of Representatives enlarged its Committee on Expenditures in the War Department, divided it into subcommittees and sent these forth on roving commissions to investigate contracts without limit of expenditure. Contractors have nothing to fear from impartial investigation and do not object to it within reasonable limits. These subcommittees employed investigating agents and counsel with instructions to find out, if possible, irregularities in contracts. They have now been engaged for months at work. Doubtless their efficiency is measured by their employers by the number of irregularities they can report. Suspicion of political partisanship at the beginning of this movement has been confirmed by the events. These subcommittees have been discredited by a series of publications and their political objects in the investigations fully revealed.

The subcommittee that went to the Pacific Coast and investigated the spruce conditions there was openly charged in a vigorous telegram from the Secretary of War with flagrant injustice, saying:

"When I asked your committee for any additional information it might secure, I assumed the committee was investigating. It now is quite clear that the committee is merely restating various assumptions made by it prior to the receipt of any evidence. In both your telegrams statements are made with regard to matters which I have investigated, and which are wholly unsupported by the facts. In addition to this, grave accusations and intimations are made against persons of the highest reputation, whose services to the country have been patriotic and upright.

"I cannot by telegram cover in detail the manifold errors in your messages. I can only express the hope that your committee will afford complete and adequate opportunity for presentation of all facts before it undertakes to make the report.

"Frankness leads me to express deep regret that the committee, not having heard all the evidence, is making its suspicions the basis of widespread and unjust publicity."

Upon their return to the East, they were met by a former Assistant Secretary of War, who had done splendid service to the Government during the war and whose record was sought to be besmirched, with open denunciation of their conduct, as well as candid explanation of the facts.

The subcommittee on ordnance delved into the contracts made by the Democratic candidate for Governor of Massachusetts and called him to Washington during actual progress of his campaign to answer charges founded upon the investigations of their special agents. He vigorously denounced their action as inspired by partisanship. The people of Massachusetts expressed their disapproval of his candidacy on public grounds of high importance, but that does not excuse the impro-

priety of the committee in endeavoring to discredit him in the midst of his campaign by bringing these charges. If the committee's real desire was to find whether the work was efficiently and honestly done, it would have scrupulously avoided a course so redolent of political partisanship.

The chairman of the same subcommittee, after investigating the largest ordnance contract made during the war by a corporation of the highest business standing, is reported in the newspapers as denouncing this company's conduct and declaring that a dozen or more officers of the Government and of the company will be prosecuted. The company felt obliged to defend itself in a page advertisement in six or seven of the most prominent newspapers of the country giving a full statement of the transaction and roundly criticizing the conduct of the investigation.

The committee has made a report to the House in which eight ordnance contracts are mentioned. It is recommended that the Secretary of War be asked to revise settlements already made in all cases where Government property was sold to the contractor, but the committee's report speaks far more mildly than the newspaper interviews ascribed to the chairman and finally concludes by saying that in some of the cases "constructive, if not actual, fraud occurred"—a phrase of little or no meaning. The minority of the committee vigorously dissents even from this finding, saying very pertinently of the settlements of cancelled contracts:

"The matter has been dealt with as a business matter, not as a political matter. It will be most unfortunate if politics be now thrust into what is a strictly business proposition."

The subcommittee on cantonments has started on a tour of investigation and is following the same methods as the other subcommittees. They investigated Camp Sherman and filled the local newspapers with charges. Study of the testimony taken shows the methods followed. Every driver of a team or workman who would declare that he loafed himself or saw loafing was brought before the committee. Responsible officers of the Government, when called, testified that the work was honestly done. Many others who could have testified to the same effect were not called. The contractor's representatives were not called.

The committee then went to Camp Grant, where the contractors built about $4,000,000 of work in two months absolutely on time and then were given an equal quantity more, without addition to their contract fee. The same methods were here followed and nothing more resulted than to show that among the many thousands on the work, some were shirkers. The record of the testimony shows leading questions asked of ignorant witnesses, in order to produce testimony unfavorable to the administration and the contractors. Witnesses without any qualification for doing more than driving a team or shoveling dirt or pushing a plane were asked questions which only the highest experts could answer and their replies were taken as substantial evidence against the contractors and their methods. No opportunity was given for cross-examination by Government officers or contractors.

It is very unfortunate that contractors and manufacturers who devoted their best energies to work during the war and officers of the Government who unstintingly gave their labors to the Government service should now be persecuted. What dampening effect will it have upon future patriotic impulses!

It would be fortunate if Congressmen could be made to realize not only the injustice of these proceedings but the reaction of the country against such partisanship.

Newark's Proposed Zoning Ordinance

FINAL action on the proposed zoning ordinance for Newark, N. J., the second reading of which, as announced in *Engineering News-Record* of Dec. 11-18, 1919, p. 1033, was reached Dec. 3, will probably be taken within a few days.

The ordinance proposes the division of the city into four classes of districts: (1) Residence; (2) business; (3) industrial, and (4) heavy industrial. Residence districts may contain, besides dwellings or tenements, lodging or boarding houses, hotels, churches, schools, libraries or public museums, hospitals or sanitariums, clubs—excepting those whose chief activities are services customarily carried on as business—philanthropic institutions other than correctional ones, railroad passenger stations, buildings incident to farming or truck gardening, nurseries or greenhouses, and accessories customarily incident to these.

In the business district the following buildings are not allowed: Blacksmiths' shops or horseshoeing establishments, milk bottling or distributing stations, carpet-cleaning or dry-cleaning establishments, coal yards or lumber yards, car barns, places for the storage or baling of scrap paper, rags or junk, any kind of manufacturing other than the manufacture of products sold at retail in the premises to the ultimate consumers, and any trade, industry or use prohibited in an industrial district.

There are 36 classes of industry which are prohibited within the industrial district because they are noxious or offensive by reason of the emission of odor, dust, smoke, gas or noise. Classes of construction coming under sections 2 and 3—that is, residence and building uses—are not excluded from the industrial district.

The heavy industrial district includes not only classes of construction restricted from the other three districts but may include any of the class of construction restricted to the other three districts. However, there is one variation; that is, that in the heavy industrial district no building will be allowed which is designed to be used in whole or in part as a dwelling or tenement for one or more families.

The city is also districted with reference to the height of buildings, there being five classes of such districts: (1) 35-ft. district, (2) 50-ft. district, (3) 85-ft. district, (4) 125-ft. district, and (5) 150-ft. district. Only in the 150-ft. district class is there any other restriction laid upon building heights, but here street widths are controlling factors. No limitation is placed upon heights of spires, steeples, grain elevators, etc. Towers and tanks on industrial buildings are also allowed.

A subdivision is also made into five classes of area districts—that is, A, B, C, D and E—this classification being made for the purpose of naming the limits of size of rear yards, side yards, inner courts, outer courts and building areas, and specifying the number of families to be housed within certain areas.

The ordinance provides for the establishment of a

board of appeals consisting of the superintendent of buildings, the chief engineer of the Department of Streets and Public Improvements, the health officer, the inspector of combustibles and fire risk, and the president of the Board of Assessment and Revision of Taxes. The superintendent of buildings is to act as chairman of the board. The administration of the ordinance is placed in the hands of the superintendent of buildings and the inspector of combustibles and fire risks.

All nonconforming uses existing at the time of the passage of the ordinance may be continued, and the reconstruction of nonconforming buildings is subject to certain regulations.

Proposed Engineer Salary Scale in Highway Service

Recommendation for Compensation Schedule of State Road Department Is Presented for Discussion and Approval

DESIRING the opinions of engineers concerned, the American Association of Engineers' committee on salaries of engineers in public service has published a proposed recommendation for salaries of engineers in the state highway services. The committee announces that the schedule which is printed below is not an outline of organizations, as it is not that body's duty to standardize or classify engineering service, but to price such service. In order that each individual in a state organization may be readily placed within the schedule, the various positions are described in considerable detail. The grouping of the positions is clear from the captions.

The schedule is given below. These figures were approved by the American Association of State Highway Officials at its recent annual meeting in Louisville.

Administrative and Executive Positions

Chief Engineer In charge of all construction and maintenance work of the department, acting as chief executive officer	$8,000	$15,000
Engineer of Construction In immediate charge of all construction work from time contracts are let. Assigned to state headquarters	6,000	10,000
Engineer of Maintenance In charge of all maintenance work. Assigned to state headquarters	6,000	10,000
Engineer of Bridges In charge of preparation of specifications and designs for bridges, and in charge of construction of special bridges. Assigned to state headquarters	5,000	8,000
Office Engineer In general charge of preparation of plans and specifications for all construction work up to point of letting contracts. Assigned to state headquarters	5,000	8,000
Engineer of Tests In general charge of laboratory routine tests, investigations, material surveys and field inspection of materials	4,000	7,000
District Engineer In charge of all construction and maintenance work in a division or district of the state, generally including a number of counties. Assigned to division headquarters	5,000	8,000

Senior Engineering Positions Involving Some Administrative Duties in the Higher Grades

Advisory and Consulting Engineer to the Chief Engineer	5,000	10,000
First Assistant Engineer Assigned to Construction Engineer. In general charge of office work in connection with execution of contracts	3,600	5,000
First Assistant Engineer Assigned to Maintenance Engineer. In general charge of office work in connection with maintenance	3,600	5,000
First Assistant Bridge Engineer Assigned to Engineer of Bridges. In charge of bridge drafting room and responsible for bridge specifications and bridge designs	3,600	5,000
First Assistant Engineer Assigned to division headquarters. In general charge of office	3,600	5,000
Assistant Engineers Assigned to Construction Engineer at state headquarters	2,400	4,000
Assistant Engineers Assigned to Maintenance Engineer at state headquarters	2,400	4,000
Assistant Engineers Assigned to Bridge Engineer at state headquarters. Acting as especially skilled draftsmen, designers and computers	2,400	4,000
Assistant Engineers Assigned to Office Engineer. Preparing and checking specifications and plans from division offices	2,400	4,000
Chief Chemist Assigned to Engineer of Tests. In charge of the chemical work of the laboratory	3,500	5,000
Assistant Engineers Assigned to division headquarters. Some in charge of construction, others in charge of maintenance, both field and office	2,400	4,000
Assistant Engineers Assigned to laboratory work. Tests and investigations in laboratory, field examinations and reports on sources of materials as assigned	2,400	4,000
Assistant Chemists Assigned to laboratory	2,000	4,000
Chief Draftsmen Assigned to division headquarters. In charge of drafting room and the preparation of plans	2,400	4,000
Chiefs of Survey Parties In charge of surveys and relocations; during time spent in office, work on plans and computations as assigned	2,400	4,000

Inspection Service

Confidential Inspectors Assigned to Chief Engineer personally. Positions of peculiar responsibilities; represent the chief engineer	4,000	5,000
General Inspectors of Maintenance Assigned to state headquarters	2,400	4,000
Inspectors of Bridge Construction Inspecting construction of the larger bridges only. Work inside on bridge plans and design as assigned	2,400	4,000
Field Inspector of Materials Assigned to Engineer of Tests at state headquarters. Inspection of materials in the field and at point of manufacture	2,400	4,000
Inspectors of Construction Assigned to Division Engineers. Inspect construction, reporting to division engineers, or a number of inspectors may be under immediate charge of some assistant engineer to whom they make immediate reports.	2,400	3,000
If inspectors are employed during working season only, to receive per month	250	300

Junior Engineering Positions Concerned With Routine Work Only

Engineering, Draftsmen, Computers, Checkers Assigned to state headquarters	1,800	2,400
Computers and Checkers Assigned to Bridge Engineer	1,800	2,400
Engineer Draftsmen Assigned to division headquarters. Preparation of plans, computations, estimates, checking	1,800	2,400
Instrument Men Transitmen and levelers. Those employed the year around work inside division offices part of time on plans, computations and estimates	1,800	2,400
If employed by month during construction season only, they should receive, per month	200	250
Rodmen, Chainmen and Tracers	1,200	1,500
Laboratory Assistants Routine testing, laboratory records	1,800	2,400

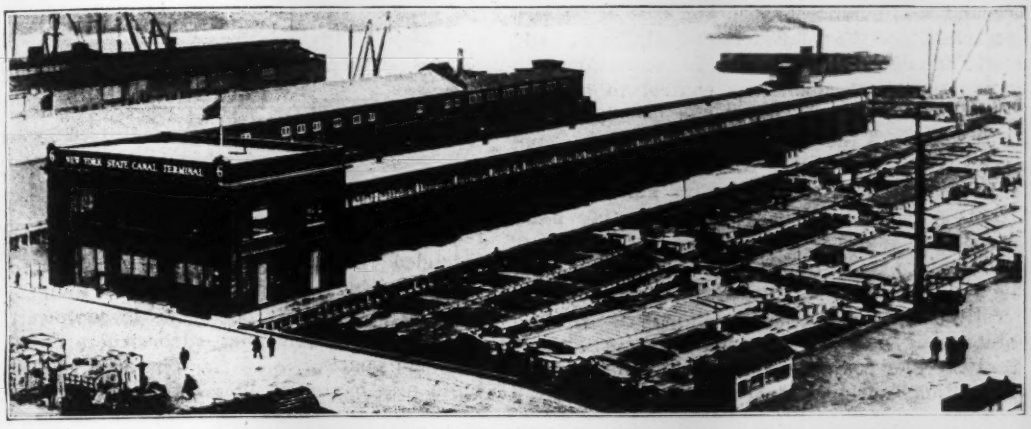
All engineers working away from state or division headquarters to which they may be assigned are to receive traveling and subsistence expenses.

This schedule not to operate to reduce any salaries now existing.

Largest Barge Canal Terminal Opened in New York City

Old Timber Pile Pier Remodeled and Provided With Modern Freight Shed and Extensive Freight-Handling Machinery Both Outside and In

By Frank M. Williams
New York State Engineer and Surveyor, Albany, N. Y.



GENERAL VIEW OF PIER 6, EAST RIVER, NEW YORK CITY TERMINAL FOR NEW YORK STATE BARGE CANAL

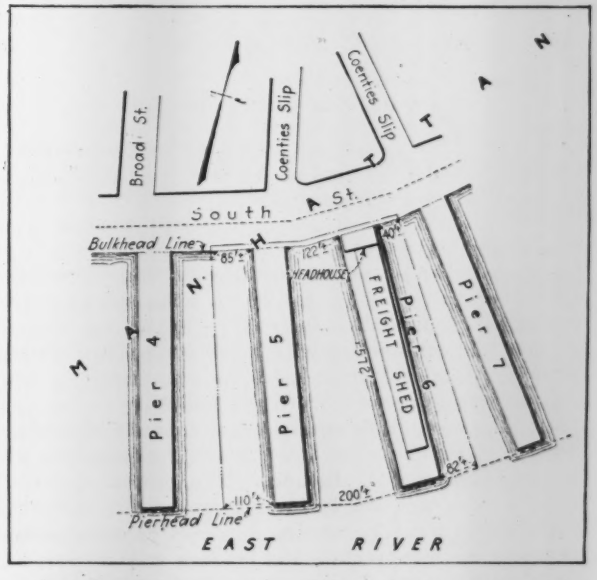
TERMINALS for the New York State Barge Canal have been completed for some time at various places along the line of the canal, but it was not until this autumn that the largest and most elaborate, on the East River in New York City, was opened for use. This structure embodies the latest ideas on the design and equipment of a freight-handling pier available to this department. In its mechanical handling equipment, particularly, it is considerably in advance of any of the piers in New York harbor.

The terminal is located at Piers 5 and 6 on the East River on property acquired by the state from the City of New York for $191,900. With the acquisition of the site, which is shown on one of the accompanying drawings, the state came into possession of a gravity section granite bulkhead wall of a permanent character and two open piers of a semi-permanent type of construction. These piers had the following dimensions: Pier 5, width 70 ft., length 570 ft.; Pier 6, width 50 ft., length 572 ft. Both piers were of timber construction with reinforced-concrete decks. Adjacent slips had from 5 ft. of water at the bulkheads to 20 ft. at the outer ends.

In making studies for the development of this site, as well as others, it was planned to work along lines that would secure the most efficient operating conditions and the most intensive use of the structures at hand. Also, in view of the fact that it was probable that several years at least would elapse before the traffic on the canal would reach large proportions, it was decided to use types of construction having a fairly long life rather than to erect structures of a cheaper type that could be quickly erected but which would have to be scrapped at a later date or require large annual maintenance charges.

The ultimate development adopted for this site provides for the shedding and equipping of both Piers 5 and 6. As an initial development, however, Pier 5 was improved only to the extent of making necessary repairs to the timber work, including a new fender system, and by the installation of two steam-operated tractor cranes of two-ton capacity which have been used to a limited extent during the past season in handling cargo between barges and the open pier. An electrically operated stiff-leg derrick of heavy capacity has been installed at the outer end of Pier 5 by the General Electric Co. under a permit from the Superintendent of Public Works in connection with its lighterage service between its plant in Schenectady and New York City.

The design adopted for the reconstruction of Pier 6 provided for an ultimate or permanent and complete development of the pier. In arriving at the scheme for reconstruction, it was found that the width of the reconstructed pier would be limited by physical conditions existing. In this connection, it is to be noted that many



SITE OF NEW YORK CITY BARGE CANAL TERMINAL

piers in the older part of the city were laid out in the days of sailing vessels of low cost carrying comparatively small cargoes and at a time when a quick turnaround of a vessel was not considered with the importance it holds to-day. As a result of conditions in those days, the piers were used more as runways for moving cargo to and from the shore than for transit storage as in these days. With the gradual development of the function of the transit storage shed as a temporary warehouse and the increase in size and cost of vessels, it has been found that the older piers and slips are totally inadequate to handle modern cargoes. In connection with barge traffic, the same conditions control to a large extent. The site at Piers 5 and 6 had been set aside for canal barges since the early days of the Erie Canal and their use for that purpose was retained when the present city charter was granted by the state. In the days of the old Erie Canal barges, the existing piers were adequate, but under new conditions the old Pier 6, for instance, before being improved and equipped, could not handle a single modern barge with a 1000-ton cargo without costly delay and confusion. Pier 6, as acquired by the state, was only 50 ft. wide and our studies showed that the pier could be widened, but not to more than 85 ft., without seriously encroaching on the widths of the existing slips. With the width of the pier determined by compromising cargo requirements with physical conditions, the problem was to get the best layout possible under the circumstances.

The question of freight-handling equipment had to be considered in connection with the size of pier available. In accordance with our general studies, the preference was given to jib cranes for transferring between barge and pier and vice versa. This type of equipment was preferred because of its speed and its special adaptability to the barges such as operate on the state canals, as these barges are without high superstructures or masts and are also without any form of cargo winch or unloading machinery.

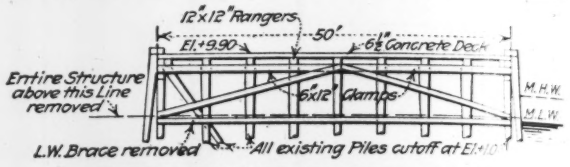
In adopting the jib cranes, it was decided to use the semi-portal type and provide an uncovered roadway on the outside of the freight house in order to keep trucking in general outside of the freight house proper and to provide areas of deposit for miscellaneous cargo as deposited by cranes on the pier deck from the hold of the barge.

Special Boom Cranes Devised

In spite of the preference for the above type of crane, it was quickly evident that with a pier of 85-ft. width, it would not be possible to use cranes of that type on both sides of the pier and still have a freight house of any considerable capacity. A decision was reached to use the jib crane and roadway on the west side of the pier and to build a freight house 50 ft. wide, bringing the east side of the building fairly close to the east side of the pier. In conjunction with a well known firm manufacturing special freight-handling machinery, a type of crane was designed to meet the conditions on the east side of the pier. This special crane consists of a boom projecting over the barge and through the doors into the freight house a short distance. The general specifications of this crane will be given later.

A decision was also reached in favor of using either industrial electric tractors and trailers or load-carrying electric trucks for distributing and assembling cargo in the freight house rather than to install an interior telpherage system.

In rebuilding the substructure of the pier, the old structure was substantially removed down to a point 1 ft. above mean low water, at which point the old foundation piles were capped and replaced with vertical posts. The old piles were entirely sound below the above point of cut-off, making it possible to utilize them



SECTION THROUGH OLD PIER 6 BEFORE RECONSTRUCTION

for the foundation of the new structure. To get the required new width of pier, the existing pile bents were extended 11 ft. on the east side and 24 ft. on the west side. Footings of concrete for shed columns were constructed in alternate pile bents in conformity with the requirements of the pier superstructure. The general pile bent spacing is 10 ft. The deck load is carried to these pile bents by 12 x 12 in. rangers or stringers spaced 6 ft. c. to c. The deck of the pier is a reinforced-concrete slab 6½ in. thick laid directly over the rangers. It is designed to carry a live-load of 500 lb. per sq. ft. A substantial timber fender system surrounds the pier.

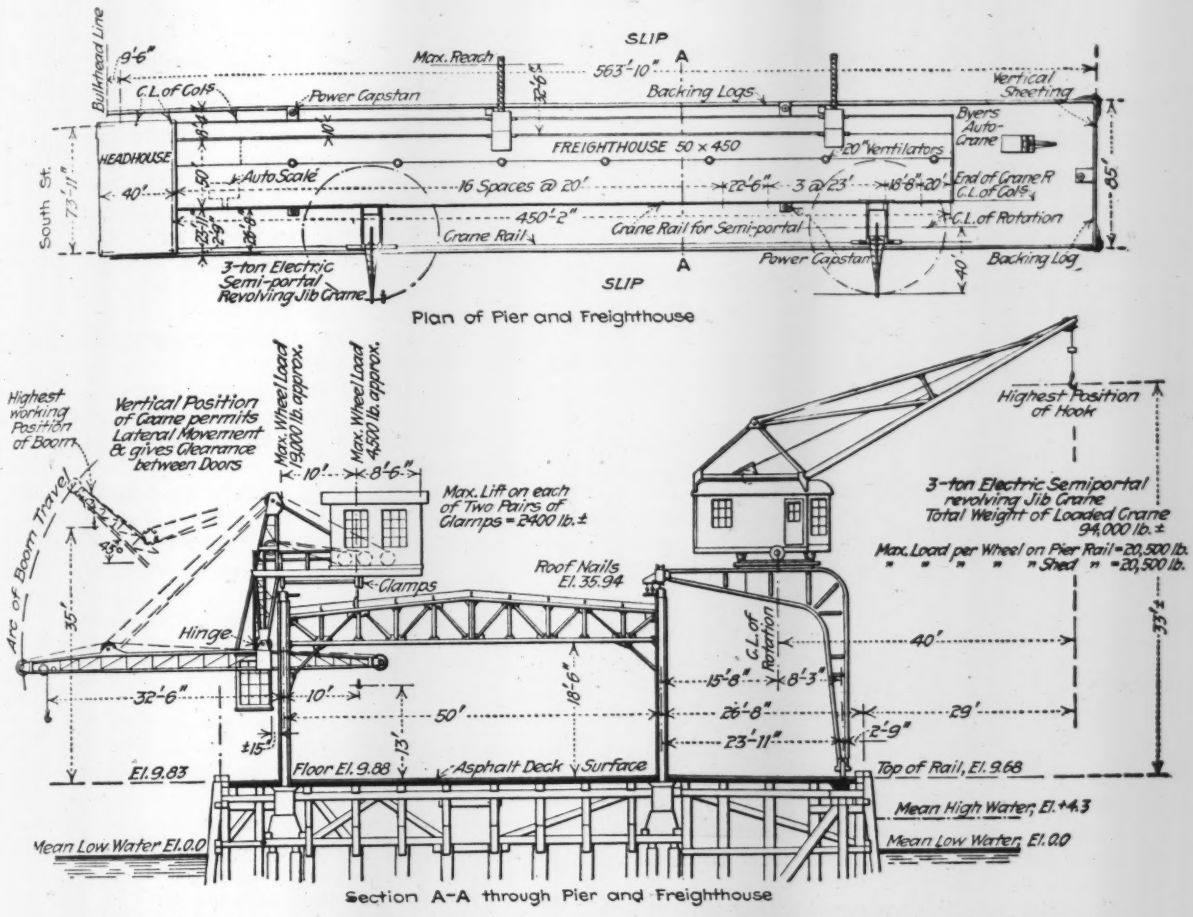
Treated Timber in Wet and Dry Section

Timber used in those parts of the pier subjected to a condition of alternate wetting and drying was treated with wood preservative. The treatment prescribed required that the dressed timber be immersed for twenty minutes in a hot tank followed by a twenty-minute immersion in a cold tank.

The concrete footings were precast units which were seasoned for 30 days before they were deposited on their grillage foundations in the sea water. It has been found that concrete precast and seasoned sufficiently may be relied on not to deteriorate when placed in contact with sea water. A crane rail girder for carrying the outboard wheel loads of the semi-portal cranes was cast into the deck near the west side. This girder is a built-up steel section having a depth of 15 in. and is supported at 10 ft. intervals on special 3-pile footings built into the regular pile bents.

The work of rebuilding and extending Pier 6 was delayed on account of war conditions prevailing. Although the work was started in October, 1916, it was not completed until the spring of 1918. The contractors were Kaufman Garcey of New York City. The contract price was $102,553.75, but under the provisions of Chapter 585, Laws of 1918, the contractor was allowed payment on a basis of the actual and necessary cost for work done after April 6, 1917, the date of the declaration of war with Germany. Under the provisions of this law, the total cost to the state of this work amounted to approximately $130,000.

The freight house proper is 50 ft. wide. In general, the columns and roof trusses are spaced 20 ft. centers with the under side of the trusses providing for a clearance of 18 ft. 6 in. except at kneebraces. On the west side of the building, the crane rail for the inshore end of the half gantry is carried on top of the building columns extended. On the east side, there is a similar



DETAILS OF STRUCTURE AND FREIGHT-HANDLING EQUIPMENT OF NEW YORK STATE BARGE CANAL TERMINAL IN NEW YORK CITY

crane rail on the columns with a parallel one 10 ft. inward and supported on the roof trusses. The latter two girders carry the special conveyor crane previously mentioned. Warehouse doors have been placed in alternate bents between columns on either side. On the west side, the clear openings are 18 ft. wide and 16 ft. high, and on the east side 18 ft. wide and 18 ft. high. The latter are higher than those on the other side to get more clearance for the conveyor cranes. The doors are two-section lift doors of the link suspension type that travel so as to allow the use of the maximum storage space within the freight house. The freight-house roof is a built-up five-ply pitch, felt and slag covering on wood. The roof is drained into substantial outstanding gutters, thence through vertical leaders to a discharge under the pier. The freight house is lighted through continuous wire-glass windows on either side adjacent to the longitudinal bracing trusses between bents.

The headhouse or office section of the freight house was built over the four inshore pile bents and the bulkhead wall, giving a depth of about 40 ft. with a width of 74 ft., leaving two narrow passageways on either side along the fender systems. The headhouse was laid out with offices for the operating force on the first floor and administrative offices on the second floor. In arriving at the proper area of office space for a pier shed of the size to be built, this department had no original data on which to base the design. An investigation showed that on six railroad piers selected, there was an average office area equal to 8% of the pier-shed area, while on 12 steamship piers there was an average area of 7%. It was found that, in general, insufficient office space had been provided. Giving due consideration to the above, and also to the anticipated special requirements of a barge terminal, it was decided to provide office space equal to about 10% of the total freight-house area. The architectural appearance of the headhouse, on which considerable care was taken, is indicated in the views herewith.

The interior of freight house, driveways, etc., has been paved with sheet asphalt.

The water-supply system provides for fire service on the pier through a 6-in. wrought-iron pipe main running from the street main to the outshore end. In the freight house proper the pipe is carried in a truss panel on the easterly side. At four different points, 3-in. branches are run down for hose connections. In accordance with local regulations, provision is made at the outshore end for connection with fire tugs and at the inshore end along the street, provision is made for fire-hose connection. The latter provisions provide an auxiliary salt-water supply not only for the pier but for nearby buildings as well.

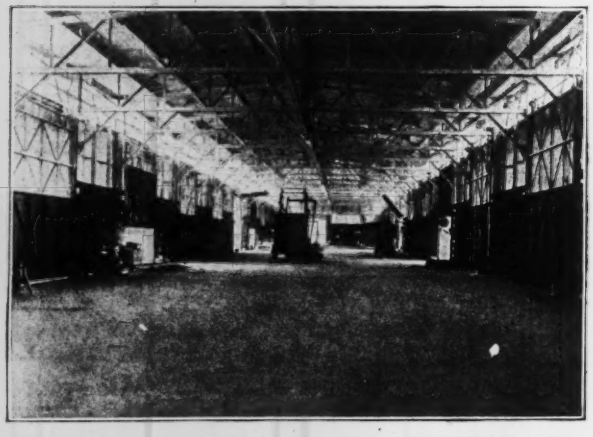
The plumbing system as installed provides complete equipment for a building of this character. Washrooms with necessary equipment have been built on the second

floor. Similar provision for stevedores is made at the outshore end of the freight house proper.

The water-supply system for fire protection is measured by a 6-in. detector meter while that for the plumbing service is measured by a 1½-in. disk meter.

Provision has been made for heating all offices, checker's rooms, halls, washrooms and battery room. A system for steam heating was installed. The radiators on the first floor are hung from the ceiling, while those on the second floor are of the standard type resting directly on the floor.

The electrical installation includes a lighting system, a power distribution system and a battery-charging system. The lighting system provides for the illumination of the offices, freight house and pier; the power-distributing system provides for the operation of freight-handling equipment; the battery-charging system provides for the charging of storage batteries for electric tractors and load-carrying trucks.



INTERIOR OF PIER 6, EAST RIVER, NEW YORK CITY

Power for the above system is obtained from a local power company. It is a direct-current, three-wire system, 120-240 volts. In the battery room previously mentioned, the necessary switchboard is located. This room in addition contains two balancer sets for battery-charging work, a one-ton electric overhead trolley hoist for handling batteries, and a set of battery-charging outlets. The switchboard has seven panels, one for the incoming line and meters, one for the power circuits, two panels for control of the balancer sets and two panels for battery charging and one panel for battery overcharging.

The illumination of offices is by semi-indirect fixtures. There are numerous plug outlets for desk lights and fans. In the freight house are two rows of lights on 20-ft. centers, and outside the building there are lights over each warehouse door. The interior lights are 200-watt Mazda lamps in enameled steel deep-bowl hoods, while the outside ones are of a similar type but with elliptical angle reflectors and 150-watt lamps.

From the power switchboard panel, mains are carried to the roof on each side of the freight house where they are connected to trolley wires running on both sides along the entire length of the building to serve the semi-portal and conveyor cranes. Other mains carry power to five capstans, to 21 safety type cut-outs and power plug receptacles for use in operating portable conveyors and tiering machines. The principal remaining power line runs to Pier 5 for use there on electric hoists, etc.

The battery-charging installation includes the two balancer sets provided, in order that whatever number of batteries are being charged, the system will not be out of balance to exceed the charging current of one battery. From each section of the battery-charging panel, cables are run to plug outlets, both in the battery room and in the freight house, so that batteries may be charged at either place. In the battery room, a heavy battery bench and a ½-ton-capacity overhead electric trolley hoist are provided so that batteries may be readily removed from tractors for repairs.

As previously mentioned, the principal equipment provided are cranes for loading and unloading the barges. As an initial installation, contracts have been awarded for two semi-portal revolving jib cranes to be erected on the east side of the pier and for two special conveyor cranes for the west side.

The semi-portal cranes have a 6000-lb. capacity, a hoisting speed of 120 ft. per min., a slewing speed of one and a half revolutions per minute and a traveling speed of 150 ft. per min. The crane operator will have a clear and unobstructed view of the load during all movements and his control is such that he can secure any particular movement or combination of movements at will. The crane has an effective outboard reach of 28 ft. The special conveyor cranes have a 3000-lb. capacity. These cranes have a main truck traveling on two rails with 10-ft. centers on the roof of the freight house. From the truck an overhanging member supports a boom with a conveyor. The boom extends over the barge and inside the freight house through the doorways. It has a clear outboard reach of 23 ft. and it is pivoted so that it may be raised to a nearly vertical position to clear the doorways and also to clear a ship's rigging. This crane is operated by four electric motors. With a load of 3000 lb. on the hook, hoisting is accomplished at a speed of 125 ft. per min., trolley travel at 125 ft. per min., boom hoist in a complete movement in one minute and traveling at a rate of 200 ft. per min. Additional cranes will be installed as business demands.

It is proposed to use tractors and trailers, and possibly load-carrying trucks also, in moving freight unloaded by the cranes from the barges to the freight house for storage and vice versa. A number of trailers have been secured. They are of a well-known make, have strong frames, with casters having roller bearings, and have semi-automatic couplers. Tractors or load-carrying trucks have not been secured as yet.

In addition to the above, one tiering machine and one portable conveyor for unloading between pier and barge have been secured. These two machines are of the endless chain and wooden slat type, driven by electric motors. There have also been installed five electric capstans, each having a capacity of 8000 lb. on a single line, at a speed of 40 ft. per minute. These capstans are intended for moving boats and other work for which they are adapted.

A 20-ton auto truck scale has been installed in the freight house proper near the street entrance.

The site as obtained from the city had slips with depths of water varying from 5 to 20 ft. Under a dredging contract, the slips have been deepened to give a minimum depth of 14 ft. at mean low water.

The freight house proper was erected by I. J. Stander & Co., Inc., of New York City, at a contract price of $128,250. The asphalt pavement was placed by the Sicilian Asphalt Co. at a contract price of $11,225. The water-supply system and plumbing were installed by Jarcho Bros., Inc., of New York City, at a contract price of $6650. The heating system was installed by Miller & Brady, Inc., of New York City, at a contract price of $2352. The electrical installation and the auto-truck scale were put in by the Lord Electric Co., of New York City, at a contract price of $16,000. A contract for the delivery of two semi-portal cranes has been let to the Edward F. Terry Mfg. Co., of New York City, at a contract price of $41,081. Delivery is pending on these cranes. Two special conveyor cranes have been purchased from Manning, Maxwell & Moore, of New York City, for approximately $24,000. These special cranes are under erection. Under a contract with the Lansing Co., of New York City, 50 industrial trailers and 50 industrial hand trucks are to be delivered. The cost of the trailers and trucks will be $4400. The portable barge unloader and stacking machine were furnished by the Brown Portable Conveying Machinery Co., of Chicago, at a cost of $5626. The five electric capstans and trolley hoist were furnished under a contract with the General Electric Co., of New York City, at a cost of $7805. The dredging of the slips was done by the New Jersey Shipbuilding & Dredging Co., of Bayonne, N. J., at a contract price of $13,035.

The cost of the freight house and all equipment so far provided for Pier 6 amounts to approximately $250,000. Adding to the above the cost of reconstructing the pier substructure, the total amounts to $380,000.

The total cost to the state for the entire terminal, including the cost of the acquisition of the site, improvements and equipments at Piers 5 and 6, and dredging, amounts to $625,000.

The design and supervision of construction of this work has been under the State Engineer. Senior Assistant Engineer Anderberg being in general charge of terminal construction in New York City, and Assistant Engineer Ely Gamse in direct personal charge of the work on Pier 6. After the construction had been completed and the equipment placed, the piers were turned over to the State Department of Public Works for operation.

Concluding a series of interviews with contractors:

Construction Labor's Instability

An Analysis—

V—In which F. J. MacIsaac, of Smith, Hauser & MacIsaac, New York City, and past-president of the General Contractors' Association, blames the administration for an infirm labor policy, reviews preceding recommendations for stabilizing labor, and insists that Americanization education be a fundamental of restrictive immigration legislation.

AN ADMINISTRATION supported in its treatment of industrial questions by academic theorists and predisposed, if not foresworn, to champion the various demands of organized labor, early in its incumbency planted the mustard seed of the present industrial and social turmoil, believes F. J. MacIsaac, member of the firm of Smith, Hauser & MacIsaac, New York City and past-president of the General Contractors' Association. And not until a firmer hand is laid upon the throttle controlling social and industrial life can the country expect anything but abnormality in these matters.

A survey of the administration's acts, Mr. MacIsaac believes, will bear out his judgment that the administration possesses this inclination, and reasons for such a belief he holds to be too self-evident to need either explanation or elaboration.

Since such industrial disorder does exist and since the question is one not for prophylactic treatment, but for therapeutic attention, he makes his diagnosis and finds industrial and social America suffering from a peculiar complication of ailments.

The first point is that industrial America is underfed; that is, the workmen to man its industrial plants and to do its construction work are inadequate in number to the needs of a healthy, growing nation.

As a partial relief for this disorder, immigration is proposed. However, Mr. MacIsaac is not certain that such a remedy should at this time be applied, because of the danger involved in further affecting the health of the patient with the poison of radicalism. Admitting that the shortage of labor is America's present constitutional difficulty, he turns to a consideration of other remedies. He finds that America's blood pressure is abnormal because of the universality of strikes, riots and general social discontent. This ailment is traceable to the first failure of the administration to cope with the labor situation, and has been aggravated by the shortage of labor. Until different administrative methods are applied, then, and until something be done to overcome the constitutional disorder, there is little help offered the patient in correction of this trouble.

Some good has been done, Mr. MacIsaac believes, in the making of wage contracts between employers' associations and those representing the several building trades, such as the contracts entered into recently in Chicago and New York. However, he does not believe that such contracts will be binding under certain circumstances. He maintains that the law of supply and demand is the supreme power affecting construction and labor, and will operate as truly in construction work as in the regulation of the price of any household commodity. For instance, should legislation be passed whereby railroads, upon their return to private management, would be able to expend considerable amounts on road betterment, all common labor would easily be absorbed by them, paralyzing general construction work.

Then, again, if architects, builders and investors as-

sume that the signing of contracts between the Building Trades Employers' Association and the Building Trades Council of New York City guarantees stability in wages and hours of employment, Mr. MacIsaac predicts the greatest building boom that New York City has ever seen. Inasmuch as the general building program is several years behind schedule, the sudden stability given wages, hours of employment, and the general labor situation, would result in the almost immediate release of extensive capital, particularly that for housing propositions.

In either case—if the railroads suddenly began extensive betterment programs, or if the general building industry were suddenly stabilized—contractors would immediately begin bidding against one another for the available supply of labor. In this competitive bidding contractors most capable of offering attractive wages, wages in excess of those named in existing contracts, would secure the services of such labor. It is Mr. MacIsaac's statement that in Chicago now, only a few months after the signing by building trades employers and unions representing them of a three-year contract naming fixed wages and hours of employment, contractors have paid, for some classes of labor, from 10 to 25c an hour more than the scale specified in that contract. He also asserts that this bidding among contractors for labor exists in New York even now, though the condition is not so serious at the present time as it threatens to be.

Mr. MacIsaac ventures the opinion that it might be well to wait a time for the enactment of even restrictive immigration legislation. He admits the crying necessity for immigration sooner or later, but whether it be the most expedient course to foster immediate restrictive legislation he is not ready to say. When that legislation becomes absolutely necessary, through a revival of railroad construction or through reconstruction, an intense impetus being given to all general and special construction, or through the absorption of available common labor by growing industry, he insists upon one thing—that education in American laws, customs, ideals and principles be a compulsory precedent to immigrants being accepted as prospective American citizens. He believes it would also be well to secure from each immigrant, upon his being landed at an American port, his declaration that he intended becoming a citizen of this country. Five years would be allowed for the immigrant to carry out his contract and if bad faith were then discovered or suspected Mr. MacIsaac would ship the immigrant back to his former home.

In the matter of restrictive immigration legislation, Mr. MacIsaac says: "Let history be our guide in choosing the class of immigrants. Scandinavia has furnished us with the most reliable class of immigrants outside of the English-speaking populations."

A certain amount of the present labor unrest, Mr. MacIsaac believes, is due to the fact that immigrants, landed upon American soil, their passports examined and themselves passed by immigration officers, are then entirely lost sight of by the Federal Government. Many of these immigrants come from socially and politically oppressed countries and mistrust all physical evidences of law and government. He firmly believes that a large percentage of immigrants are potentially excellent citizens, but their education and training are neglected, and the Government they have heard of as the benign protector cares little where they go or what they do after passports have been surrendered. Should the American Government undertake to educate the foreigner, upon arrival here, in the principles and ideals underlying the American governmental system, Mr. MacIsaac promises immediate results.

Recognizing, then, that the constitutional disorder from which America is suffering—viewed from the perspective of the contractor—is improper nourishment, there appears but one sensible cure: Wholesome food and plenty of it. But Mr. MacIsaac advises against America being allowed to gorge with no regard to the quality of the food. Rather he advises the establishment of a dietetic bureau for the careful examination of the nutritive values of all food proposed to return labor-hungry America to a healthy, normal being.

"And whatever bureaus for the control of immigration be established," said Mr. MacIsaac, in conclusion, "let them be properly officered, not by schoolmasters and theorists, but by practical employers and hard-headed business men."

Report on 1918 Rail Failures

Continued improvement in rail performance is made evident by the rail-failure statistics for 1918 collected by the rail committee of the American Railway Engineering Association and published in a recently issued bulletin of the association. M. H. Wickhorst, engineer of tests for the committee, summarizes the five-year performance of successive yearly rollings of rails, from service records compiled down to November, 1918, as follows:

Rail rolled in 1908 (service, from 1908 to 1913), 398.1 failures per 100 track-miles; rail rolled in 1909, 277.8; rail rolled in 1910, 198.5; rail rolled in 1911, 176.3; rail rolled in 1912, 107.1; rail rolled in 1913 (five years' service ending with Nov. 1, 1918), 91.9. The improvement shown by these figures is very closely in accord with a projected curve of hoped-for rail improvement, drawn up by Mr. Wickhorst several years ago, according to which rail failures per unit of service and per unit of track length would decrease continuously, though less rapidly as time goes on.

Bessemer rails continue to show a larger number of failures per unit of track than open-hearth rails, the ratio (for five years' service of 1913 rail) being 1.19 to 1.0. Since Bessemer rails in general were in less severe service than open-hearth, the actual difference in quality is considered to be even greater than this ratio indicates.

One important conclusion drawn by Mr. Wickhorst from the statistics is that the rollings of rails subsequent to 1914 are lower in quality than earlier rollings. As an example of the records, 1916 rails in two years' service totaled about 50% more failures than did 1914 rails during their first two years (29.2 failures per 100 track-miles, as against 19.8). The most pronounced irregularities are shown by the short-time service records of 1916 and 1917 rails; thus, 1917 rails in approximately one year of service averaged 21.6 failures per 100 track-miles, whereas 1914 rails during their first year of service showed only 8.2 failures.

Chicopee, Mass., Steel Standpipe Subject of Suit

Engineer Who Criticized Design Sued by Builder. As a Result All Information Withheld on Record Structure

IN CHICOPEE, Mass., a city of about 30,000 adjoining Springfield, there is now being built a steel standpipe 50 ft. in diameter and 130 ft. high, one of the largest structures of its type in the world. With the exception of a number of gas-holder tanks, in which special design problems enter, and of the recently completed Los Angeles standpipe with its 150 ft. diameter and 51 ft. height, the Chicopee structure has the highest shell tension at the base of any water-holding tank or standpipe on record. This fact alone would make it worthy of record, but it has attained some notoriety because of a lawsuit, unique in the history of engineering, in which the builder is suing an outside engineer for "malicious injury of business" on account of his making an adverse report on the design. Overawed by the possibilities of this suit, the city authorities profess to know little about the design, and the builder refuses absolutely to give any information on either design or construction. The structure itself is so far along toward completion that it would be difficult to make measurements of its integral parts, even were the builder not decidedly opposed to anyone attempting to make a personal examination.

In consequence, there is being built in Chicopee alongside the existing standpipe and on a watershed which includes several homes nearby, a 2,000,000-gal. tank, which, on the face of such information as can be obtained, is bolder than conservative practice permits, and one in the design of which it does not appear that any competent engineer outside the builder's employ has ever been concerned. Furthermore, the original design has been severely criticized by several outside engineers. Possibly the structure as built has been improved over that original design, but if it has no one outside of those immediately concerned knows of it. In other words, a public structure involving public safety and public money is being built practically in secret, and under conditions that make its adequacy doubtful.

Standpipe Perhaps Largest on Record

Some time ago the water department of Chicopee decided that it should have additional supply in a standpipe alongside of the existing standpipe on Keating Hill at Chicopee Falls. It accordingly established the size as 50 ft. in diameter by 130 ft. in height, and asked for bids on a steel standpipe of these dimensions. The lowest bid, accompanied by elementary drawings of a standpipe of this size, was submitted by Walsh's Holyoke Steam Boiler Works of Holyoke, Mass. About this time a Springfield engineer, H. B. Andrews of the firm of Andrews, Tower and LaValle, came into the case. Mr. Andrews has specialized in reinforced-concrete standpipes, and called on the superintendent of waterworks of Chicopee with the intention of discussing the possibility of a concrete standpipe for the city. As soon as he learned the dimensions, however, he told the superintendent that he could not guarantee the water-tightness of a concrete standpipe of this size. At the same time, he asked to see the design of the steel tank submitted by the low bidder. The superintendent then showed him "a plan, not complete in detail, showing a perspective view, thickness of plates and detail of foundation without details of riveting."

According to his statement, he was sufficiently interested to calculate the working stresses in the lower circular plates of the design, and "found that there was a considerable deficiency in strength in accepted engineering practice." He later took the matter of the design up with the mayor, and he states that the mayor was sufficiently concerned about the matter to ask Andrews to submit a report. This report was accordingly transmitted to the mayor under date of June 30, 1919, and contains a number of criticisms of the design which will be discussed hereinafter. Mr. Andrews did not hear from the mayor, but later found that there were political controversies in the city which seemed to preclude the possibility of getting very far in the matter, and that the board of aldermen apparently were prepared to award the contract to the lowest bidder. Later Mr. Andrews discussed the situation with some of the local manufacturers who, according to Mr. Andrews, verified the main contentions of his criticism.

Criticisms Repeated in Letter

Nothing further was done in the matter by Mr. Andrews until Sept. 5, when he sent another letter to the mayor reiterating his previous criticisms of the standpipe. Meanwhile, some time between June 30 and Sept. 5, the contract for the standpipe was awarded to Walsh's Holyoke Steam Boiler Works for $66,000, and they thereupon guaranteed to the city its safety for a year after completion. They also furnished a general riveting diagram and specifications, which among other things supplemented the riveting diagram. These specifications are now not available. The Walsh company refuses to permit them to be seen; the City of Chicopee is apparently unable to locate them or at least is unwilling to show them.

Meanwhile, in the Springfield *Union* of Sept. 6 there appeared the text of both Andrews' report and letter, together with some additional statements by him. Soon after the publication of this article the Walsh company sued Andrews and his firm for malicious injury of their business, libel and slander.

What was the nature of the report on which this unique suit was brought? It outlines the theory of standpipe design. It shows that for standpipe of the dimensions at Chicopee the maximum bottom-shell tension is 203,125 lb. per ft. of height. It computes the wind pressure on the pipe but not the unit effect on the structure, but suggests that stability against collapse or overturning should be looked into. It refers to a paper by C. W. Birch-Nord, in the *Transactions* of the American Society of Civil Engineers, Vol. 54, 1909, in which "a working stress of 12,000 lb. per sq.in. is recommended, with an efficiency of about 70%, due to riveted joints." It states that this is a working stress "generally adopted," although it quotes from the paper to the effect that the highest shell tension advocated by any engineer of note is 15,000 lb. per sq.in. It states that the bottom shell tension on the $1\frac{3}{16}$-in. plate shown in the elementary drawing shown Andrews by the superintendent of the water-works gives a unit tensile strength of 20,634 lb. per sq.in., according to the standard methods of design, as against 12,000 lb. of "standard practice." It states that according to established theory the thickness of the shell should be slightly

over 2 in. instead of the $1\frac{3}{16}$ in. of the design. It says that the load imposed on the soil is about 4½ tons per sq.ft., whereas the soil at Keating Hill, which is a soft fine sand, would be assumed to support a load of 3 to 4 tons. Therefore "a careful study should be made of the foundation." It suggests the substitution of twin standpipes 35 ft. in diameter and 130 ft. high.

In this same published report Mr. Andrews states that the Fisk Rubber Co. practically verified his report, and that the Boston Manufacturers' Mutual Fire Insurance Co. had its engineers at work examining plans of the standpipe for several days and wrote a letter of condemnation of the design to the superintendent of the Chicopee water-works, in which they went into the details of construction, and showed that in parts of the structure there is a factor of safety of less than 2 as compared with the established practice of using 5 for the factor of safety for this class of work. Further, Mr. Andrews reports that he called the structure to the attention of the chief of state police of Massachusetts, and that the chief, while not giving expert opinion, suggested that the structure was insufficient and that the mayor of Chicopee would be responsible if any damage resulted from the construction.

Text of Letter

The later report to the mayor, dated Sept. 5, read in part as follows:

I understand that work is still being carried on on the standpipe for the City of Chicopee, in spite of the fact that it is of dangerously weak design. (1) In a well-designed standpipe the ordinary factor of safety is 5. (2) In a standpipe of these dimensions larger than ever before built, the factor of safety should be increased rather than decreased. (3) Parts of the standpipe as designed have a factor of safety of less than 2. (4) The molasses tank in Boston failed with a calculated factor of safety when investigated of practically the same. (5) The engineering department of the Boston Manufacturers' Mutual Fire Insurance Co. has worked several days on investigating this design and written a letter to your superintendent of water-works, corroborating my statement. (6) The chief of the Massachusetts District Police has also investigated the strength of the structure. He says that he had no jurisdiction over it, but in his opinion the City of Chicopee, through its mayor, is criminally negligent in allowing work to proceed and would be criminally responsible in case of serious accident in the face of expert engineering advice warning against such probability.

This ended Andrews' connection with the case. Obviously, the situation was one in which the engineering profession would be profoundly interested. An effort was therefore made by *Engineering News-Record* to confirm the various issues, not with the idea of criticizing or condemning anyone connected with the affair but in order to ascertain the truth of the various allegations. This investigation has proved most difficult. Walsh's Holyoke Steam Boiler Co., acting, no doubt, under advice of counsel, has refused to make any statement whatsoever regarding its connection with the structure though it promises full information "when the suit is settled." An officer of the company even went so far as to attempt to prevent a representative of this journal from looking over the structure. The same officer intimated that the suit against Andrews was brought because he was meddling in the case in order to get the design of a concrete standpipe to be substituted for the steel pipe submitted by the Walsh company and further that Andrews had never seen the real drawings of the standpipe.

The present administration of the City of Chicopee was defeated for reëlection early in December and is to be supplanted by a new administration the first of January. The Board of Water Commissioners takes the stand that the case is in litigation and refuses to give any information, but a representative of the paper was allowed to see what drawings were said to be in the city hall. These "drawings" consisted of one small blueprint showing an elevation of the tank with an outlined indication of a stepped foundation. This drawing gave the plate dimensions with a maximum of $1\frac{3}{16}$-in. thickness at the base. It is reported that there was a typical riveting diagram submitted at the same time, but this diagram was not available, nor was it possible to see the specifications which further explained the riveting layout and the kind of metal to be used. It is also reported that there was originally a drawing showing the foundation in some detail, but this drawing could not be found in the offices of the superintendent of water-works.

Inspection of the standpipe itself is not very informing. Visitors are not permitted to go very close and exact measurement of the plates is, of course, impossible. The pipe is fast approaching completion, as the foundation has all been put in and its detail is not, therefore, observable on the ground. An examination of the tank showed, however, that the lower plates are no thicker than the $1\frac{3}{16}$ in. specified in the original drawing, that the lower rings, about 7 ft. high, have butt joints with a double strap, the outside cover plate being about 12 in. wide, with four vertical rows of staggered rivets about 4½ in. outside pitch, the inside cover plate about 20 in., with two extra rows of staggered rivets on each side at the same pitch through cover plate and main plate. The lowest plate is double riveted to the ring angle at the base, and fastened with a single riveted lap joint to the next ring. Nowhere is there available the size or even evidence of the existance of a bottom plate. Field rivets were being placed with compressed-air rivet hammers. These rivets at the bottom ring were 1¼ in. in diameter.

Foundations of Special Type

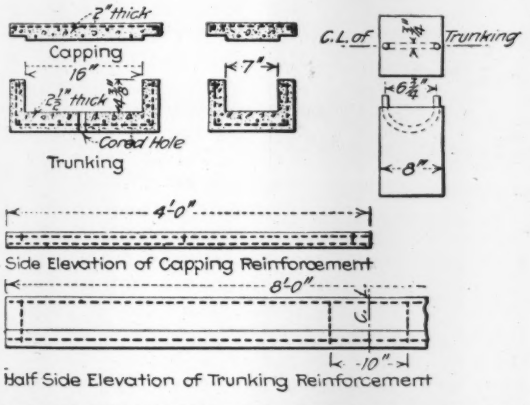
The foundations are reported variously. The original design, it is stated, consisted of a circumferential concrete wall carrying the shell, with a center pedestal and a 15-in. concrete floor spanning the circumferential wall and resting on the center pedestal. In construction it is reported that the whole standpipe is supported on a 2-ft. concrete floor heavily reinforced with rods, and supported, with interposed bracket, on pedestals spaced every 10 or 15 ft. around the circumference (instead of a circumferential wall as designed), and on a center pedestal with a heavy bracket connection. The concrete floor is laid, it is stated, on a heavy puddle fill washed in over the good sand top of the hill, and it is further intended to protect the outside of the foundation as well as that of the existing standpipe, with a concrete paving so as to prevent underwash in case of any overflow of the tank, which is not roofed.

Construction on the standpipe is proceeding normally and it should be soon turned over to the city for acceptance. For a year thereafter the builder is responsible for its safety. After that the city automatically assumes responsibility. Meanwhile Andrews has replied to the Walsh company suit denying all the allegations and the trial is set for some time toward the end of December.

Concrete Conduit for Track Wires: New York Central Railroad

CONCRETE trunking or conduit for electric wires laid above ground along railway tracks has been introduced extensively on the New York Central R. R. during the past few years, owing to the scarcity and high price of the cypress lumber which is used ordinarily. As compared with untreated cypress, the first cost of concrete trunking in place is about three times as great in the smallest sizes, twice as great in medium sizes and equal to that of wood in the larger sizes, according to a statement in a paper presented to the Railway Signal Association by B. A. Lundy, assistant signal engineer of the road. Maintenance expense is eliminated, no painting is required, and there is no periodical renewal in patches, as with wood, while the material can be taken up and relaid with little trouble or damage. Where wires are led across the tracks, concrete trunking has the advantage of eliminating trouble from fire and damage to the wires caused by cinders dropping from the engine.

This trunking consists of shallow rectangular troughs, having flat covers which fit within the sides so as to be adjusted and secured automatically. It is



REINFORCED-CONCRETE CONDUITS FOR ELECTRIC WIRES LAID ALONG RAILWAY TRACKS

made in widths of 2 to 16 in., all sizes above 4 in. being 4⅜ in. deep to allow for a wooden rack which is laid in the bottom to carry the wires. In the smallest sizes this rack is omitted and the depth is only 2½ in. Along the center line of the bottom are cored ½-in. drain holes 4 ft. apart and also pairs of ⅞-in. holes to fit studs which project from the supporting piers. No grouting is used, the trunking being held in place simply by its weight. These piers are spaced 4 ft. on centers except that where trunking is laid in the ballast the piers are placed only at the joints. Horizontal iron handles are fitted along one side of the cover for the larger sizes. The trunks or troughs are made in lengths of 4 ft., 6 ft. and 8 ft., while the capping is in lengths of 2 ft. and 4 ft. to facilitate removal for inspection and repair of the wires.

A concrete mix of 1 : 2 : 2 is used, the coarse aggregate being stone that passes a sieve of ⅜-in. mesh. Reinforcement consisted formerly of wire netting or metal lath, but the plans as revised in September, 1919, provide for ¼-in. twisted rods wired together at all intersections. For convenience the troughs are poured in inverted position, the forms being removed in 48 to 96 hours, according to the temperature. Outlet holes for branch leads are made by wood blocks or cores placed in the side forms. Junctions with lateral lines of wiring are made by cutting away the side of the trough or by cutting out the bottom if the lateral wires pass below the main lead.

Most of the material is made in the field, near the work on which it is to be used, but some has been purchased from manufacturers and shipped as required. For the field work, a gang of seven men with a power mixer produces about 200 ft. of 7-in. trunking per day, the output being limited by the small number of forms used. In present practice no built-up wood forms are required, the trunking being cast on a level floor on which are placed separating strips of 2-in. plank of the proper height and spacing. These are wedged in place, being removed after the concrete has set. This plan has been found to give better results than building forms for the separate pieces.

In weight per foot the trunking ranges from 25½ lb. for the 2-in. size to 63½ lb. for the 16-in., while the capping ranges from 12½ lb. to 41½ lb. respectively. Four men can handle the heavier sections without much difficulty, so that no power appliances are used. It is stated that after a little experience the men can lay the concrete conduit as fast as they can build a timber conduit of the same size. The designs for this concrete trunking were worked out under direction of W. H. Elliott, signal engineer of the road.

Reinforcing in Concrete Pavement

IN DISCUSSING results with reinforcing in concrete pavements, one of those present at a recent meeting of Western engineers made the following comments:

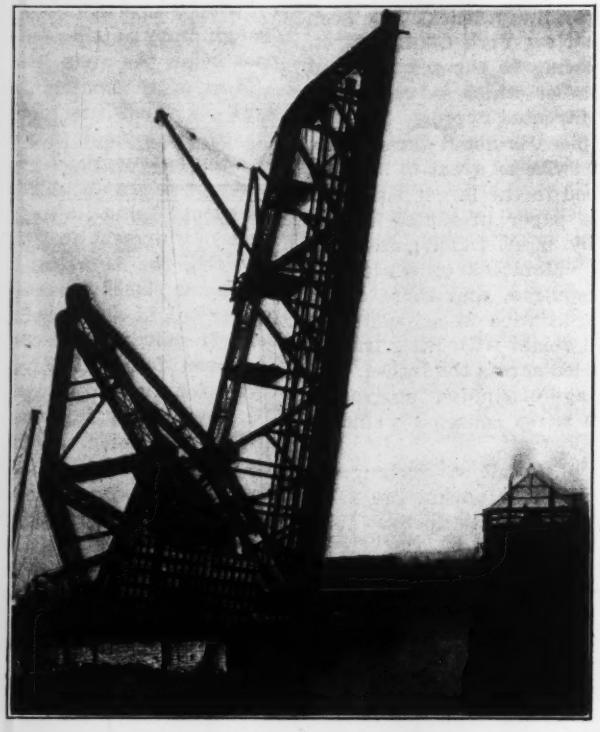
"Reinforcement has been used in many places and has always been a good investment. There is often a clear line of demarcation between that portion which was reinforced and the one which was not so treated. The reinforced section is generally without a longitudinal crack, while the reinforced section adjoining would be shattered in every direction. I am not prepared to state that expansion of adobe has anything to do with it. Rather I should say that it is due to settlement laterally. If water be kept out of adobe by oiling and so making waterproof the shoulders and subgrade and good and deep side drainage is provided, probably much of the trouble may be obviated. A layer of sand on top of the adobe, while often advocated as a cushion, has in some cases permitted water to percolate beneath the pavement and water has so softened and settled the subgrade that the pavement has been quite thoroughly shattered. The proper way is to make the subgrade impervious to moisture.

"Both triangular mesh and bar reinforcing have been used and both have proven satisfactory. The bar placing is undoubtedly the simpler and cheaper method. Since the lateral cracks always appear to be wider at the top surface, undoubtedly the reinforcing should be placed in the upper part of the pavement. Weight for weight, the mesh reinforcing costs not only more per pound but also is more difficult and consequently more costly to place. . . . Rim reinforcing should always be used with artificial expansion joints, or where there is a doubtful subgrade or shoulder material."

Longest Single-Leaf Bascule Bridge: Chicago River

Double-Track, 260-Foot Span Has Unusually Large Trunnions, Cantilever Tower, Pneumatic Buffers and Emergency Brake — Plan to Move Bridge to New Site

A NEW double-track through bridge, 260 ft. between trunnions and end bearings, which carries the St. Charles Air Line across the Chicago River near 16th St. is the longest single-leaf bascule yet built. Three single-leaf double-track bascules rank next to this new structure: The 235-ft. span of the Baltimore & Ohio R. R. over the Calumet River at South Chicago, Ill., the 200-ft. span of the same railroad over the Cuyahoga River at Cleveland, Ohio, and the 200-ft. skew span (with one 206½-ft. truss) of the Great Northern R. R. over the Salmon Bay waterway at Seattle, Wash. Particulars of these and other large drawbridges were noted in *Engineering News-Record* of May 2, 1918, p. 860.



LONGEST SINGLE-LEAF BASCULE BRIDGE SPANS CHICAGO RIVER, SUPERSEDING OLD SWING BRIDGE

The new 260-ft. span at Chicago crosses the river at an angle of 63½° and provides a navigation width of 200 ft. measured at right angles to the channel, while the former 297½-ft. swing bridge was on a skew of about 42° and gave two channels 59 ft. and 55 ft. wide. By changing the railway alignment slightly it was possible to place the new bridge far enough to the north of the old one to avoid interference with the latter during construction and at the same time to obtain a minimum length of span, but the location was governed largely by the track layout on the east side of the river.

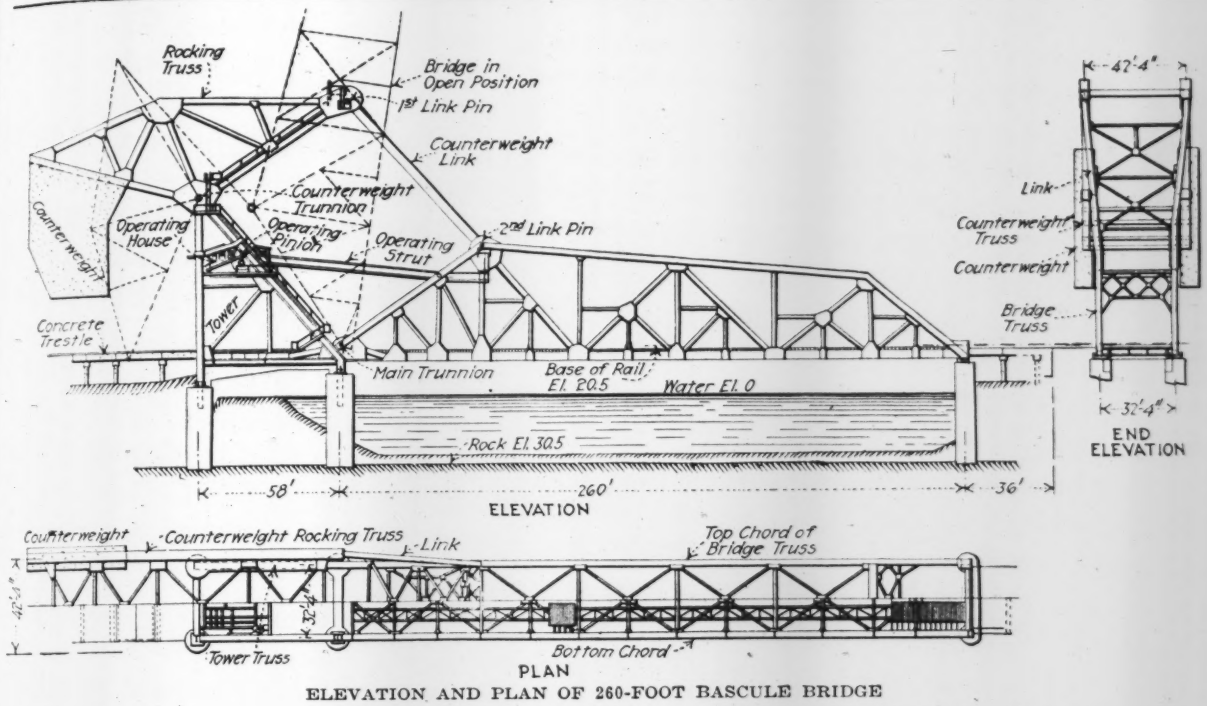
This bascule bridge is of the Strauss type. Its general design is shown in the accompanying drawing. Two Warren trusses having subdivided panels and inclined top chords constitute the main part of the moving leaf, which was designed for Cooper's E60 loading. This leaf revolves upon trunnions at the bottom-chord level. Its counterbalance system consists of a pair of rocking trusses mounted on a tower and carrying concrete counterweights on their rear ends, while to their forward ends are attached links connected to pins at the hip joints of the top chords. The weight of the structural steel is about 1544 tons and that of the machinery is about 166 tons.

Operating struts to raise and lower the bridge are connected to the end posts of the span, the connection being made at an intermediate point on the post instead of at the hip joint, which is the more usual arrangement in bridges of this type. The new plan was adopted in order to permit the use of shorter struts. Racks upon these struts gear with the main operating pinions, which are driven through an equalizer and reduction gears by two 150-hp. alternating-current motors on a 440-volt, 3-phase, 60-cycle circuit. A concrete cabin built into the tower contains the operating machinery and controlling equipment, together with a 60-hp. gasoline engine for emergency drive and an air compressor for the brakes. The bridge can be raised or lowered in 1¾ minutes.

While the structural design of the leaf presents no new features in general arrangement, attention may be drawn to the exceptional size of the members, required by the length of the span and the heavy loading. This may be judged from the fact that the main trunnion pins are 25 in. in diameter and 27 in. long on the bearing area; the counterweight trunnion pins are 46 x 44 in., and the first and second pins of the counterweight links are 20½ x 53 in. and 31 x 27 in. respectively. Phosphor-bronze bushings are provided for both sets of these enormous trunnion pins and the bushings are free to turn in the cast-steel bearings. Double lubrication is thus permitted, lubricating grooves being provided between the bearing and the bushing as well as on the inner surfaces of the bushing which carries the trunnion pin.

An unusual feature in the design of the tower is that the upper part of each side frame is cantilevered outside of the lower part, with a distance of 5 ft. between the vertical planes of the two parts. On these overhanging portions are mounted the bearings for the counterweight trunnions. The object of this arrangement is to place the counterweight truss in the middle of its concrete counterweight block and thus avoid any eccentric loading of these trusses. Deep portal girders in the planes of the vertical and inclined posts of the tower provide for the eccentric load due to the overhung position of the bearings.

Outside or wing counterweights carried on the ends of the rocking trusses are used, being more economical for such a large bridge in that they give a greater leverage than the earlier arrangement of a single counterweight block extending between the ends of the rocking trusses and across the tracks. Each wing counterweight is about 37 x 60 ft. in size, 5 ft. to 5 ft. 7 in. thick, and is made of concrete estimated to weigh 148 lb. per cubic foot, which gives a total of 1770 tons for the two counterweights. Rectangular openings in the outer faces provide for the insertion of blocks to



ELEVATION AND PLAN OF 260-FOOT BASCULE BRIDGE

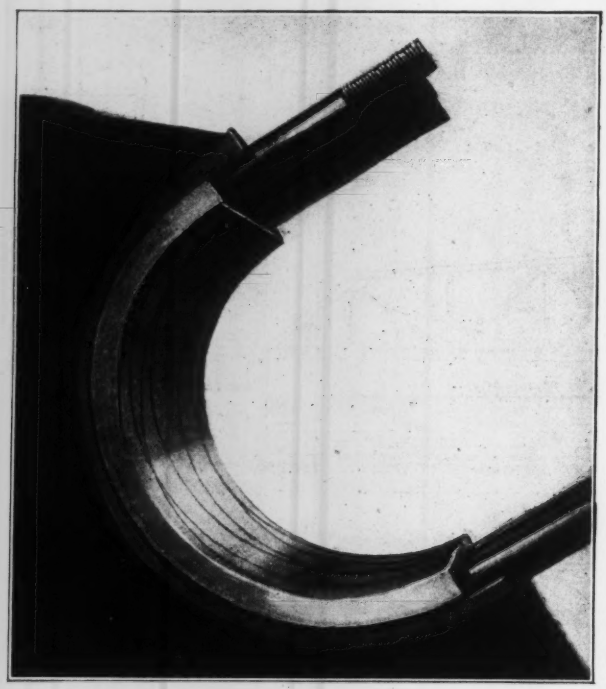
adjust the weight. With the bridge open, the lowest point of each counterweight is about 8 ft. below rail level.

The reasons for using the wing counterweights, which have been used also in some previous bridges of the same type, are as follows: They permit of an increased moment arm, as the size and movement are not limited by railway clearances; they do not obstruct the view of the railway from the operating cabin; they give lower stresses in the counterweight trusses and lower reactions in the counterweight trunnions. Furthermore, when used on bridges erected over existing tracks and on the same center line as the old bridge they avoid interference with traffic which may be involved when the single transverse counterweight block is used.

As the rocking counterweight trusses are 5 ft. outside of the line of the tower frames and main trusses of the bridge, the connecting links are not parallel with either the counterweight trusses, or the bridge trusses, but are spread 32 ft. 4 in. between centers at the bridge end and 42 ft. 4 in. at the counterweight end. These links, 85 ft. 8 in. long, are in direct tension and are braced together by struts and diagonal bracing to take the horizontal or transverse component of the link stress due to the 10-ft. difference in spacing at the opposite ends. Thus there is no eccentric loading on the counterweight trunnions, all eccentricity being taken up in the link connections.

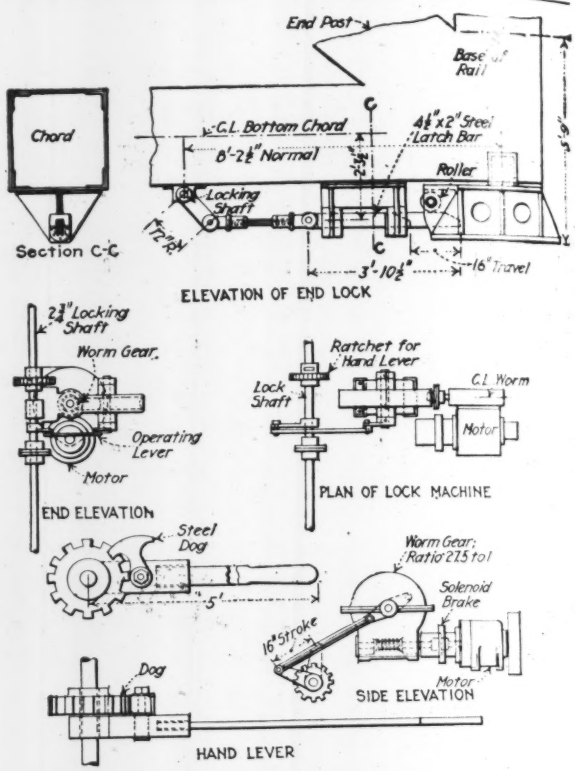
Air buffers are used on the operating struts, on account of the great size of the bridge, these being in addition to the oak bumping blocks ordinarily used and coming into play when the span is raised to an angle of 82½° (the full opening being 83°). Near the bridge end of the top of each strut is a 15 x 23½-in. cylinder, having a piston with rod 6 ft. 3 in. long moving in a guide casting. This rod is held normally at the outer end of its stroke by a group of coiled springs having one end attached to the piston and

MAIN TRUNNION IN BOTTOM CHORD



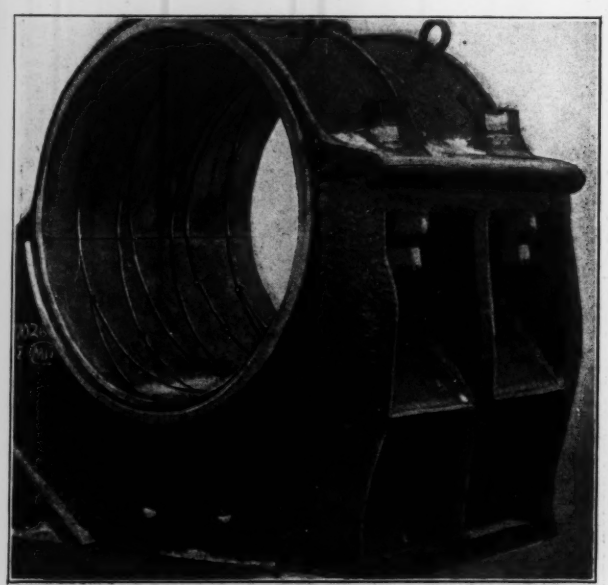
MAIN TRUNNION BEARING

the other end to the casting. When the bridge nears the limit of its opening the ends of the rods engage a short I-beam bumping girder secured to the inclined post of the counterweight tower. Further movement of the bridge then drives back the piston, compressing the air, which escapes through adjustable valves, thus gradually arresting movement after the power has been cut off and motor brakes applied. A similar air buffer under the front end of the leaf comes into play when the bridge closes, the piston rod engaging the bridge seats on the rest pier. The application of the air buffers to check the opening movement is new, but several bridges of this type have air buffers to check the closing movement.

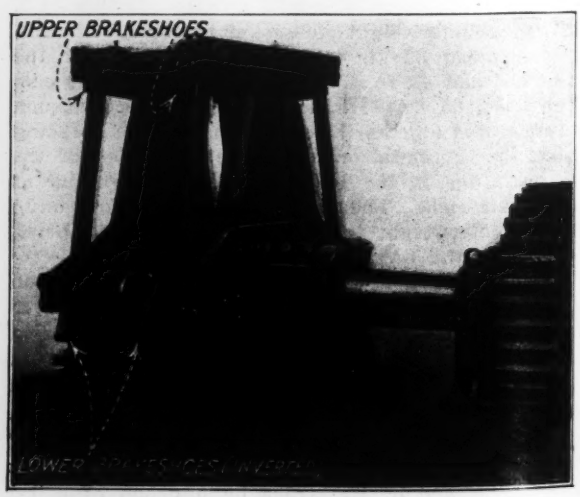


END LOCK WITH MOTOR DRIVE AND EMERGENCY RATCHET

Latch bars moving in guides beneath the bottom chords of the trusses form the end locks, these bars engaging sockets in the shoes on the rest pier. The rear end of each bar is attached to a lever arm on a transverse locking shaft, which shaft is operated by a motor-driven worm gear with a connecting rod extending from the worm-wheel shaft to an arm on the locking shaft. For emergency operation the shaft has a ratchet wheel and arm, the latter carrying a pawl or dog and having a socket for a hand lever. No rail locks and rail lifts are used, but the rails have square joints



COUNTERWEIGHT TRUNNION BEARING



PNEUMATIC BRAKE FOR OPERATING STRUT

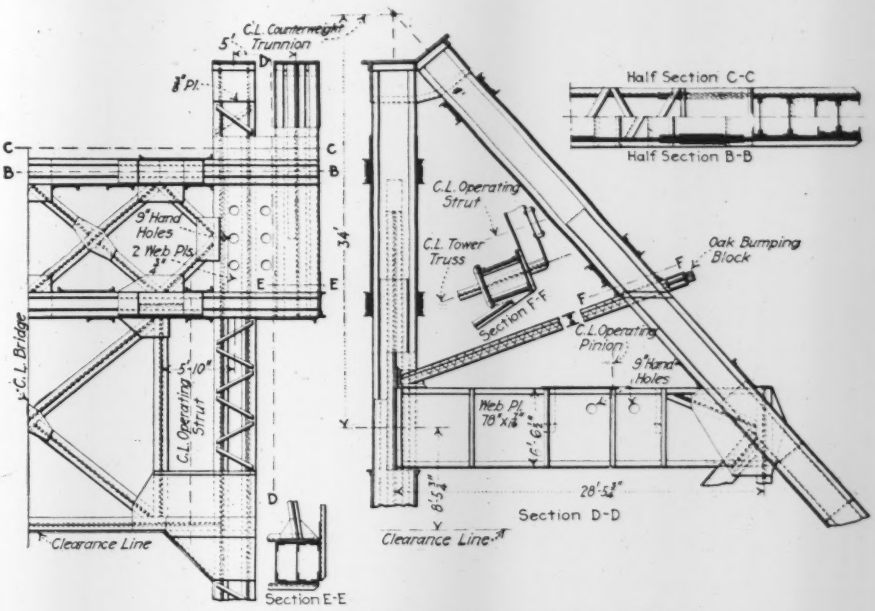
with connecting yokes as in many bridges of this type.

An emergency brake on each operating strut, controlled from the cabin, is a novel feature. This is operated by compressed-air cylinders in line with the strut and secured to flanges on the bottom of the strut guide. The pistons are connected by means of connecting levers and eccentrics to eight brake shoes—four each for the top and bottom flanges of the strut. The upper shoes show in approximately correct position in the last illustration on p. 1058, but the lower shoes are hanging with their contact surfaces downward; in position on the bridge they are reversed so as to bear on the bottom flanges of the strut.

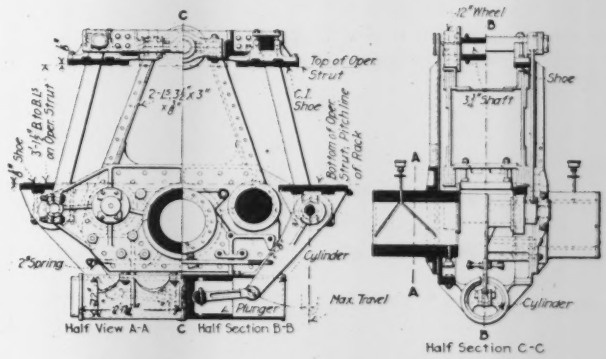
These emergency brakes are for use when the ordinary motor brakes are insufficient in case of accident to the operating machinery or other emergency. They serve also as a positive lock for the bridge in any position, irrespective of the bridge operating machinery. They relieve this machinery from the stress due to the shock of applying emergency braking force on an intermediate shaft, which method was employed before this air brake was developed. Thus the operation is not dependent upon the gears and shafts between them and the operating pinion and rack. Nor are they dependent upon the rack and pinion teeth, being applied directly to the structural flanges of the operating struts.

Timber falsework was used in the erection, constituting a new departure for bridges of this kind. As the bridge is on a new location near the old swing bridge, the work involved no interference with railway traffic, but the almost universal practice of erecting the leaf in the open position was followed to avoid interference with river traffic.

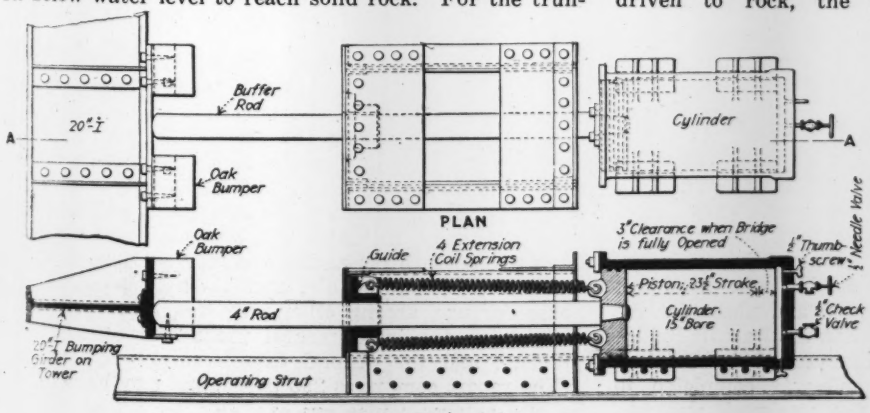
Concrete cylinder piers form the main part of the substructure as in many of the Chicago River bridges, but the cylinders had to be carried down only about 30 ft. below water level to reach solid rock. For the trunnion end of the bridge there are two pairs of 11½-ft. cylinders connected by traverse and longitudinal concrete girders. Here the rock was covered with only about 5 ft. of soft clay and a double wall timber crib was floated and sunk in place, being then pumped out to about 15 ft. Inside of this steel sheet piling was driven to rock, the piles being driven around a circular form and concrete being deposited directly against them. After the concrete had set the piles were withdrawn, but the timber crib remains in place as a fender protection for the piers. The rest pier, at the free end of the span, consists of two 8-ft. cylinders and a concrete cross-girder. At each end of the bridge is a short concrete trestle approach consisting of pile bents and caps about 14 ft. between centers, supporting a floor built up of precast concrete slabs.



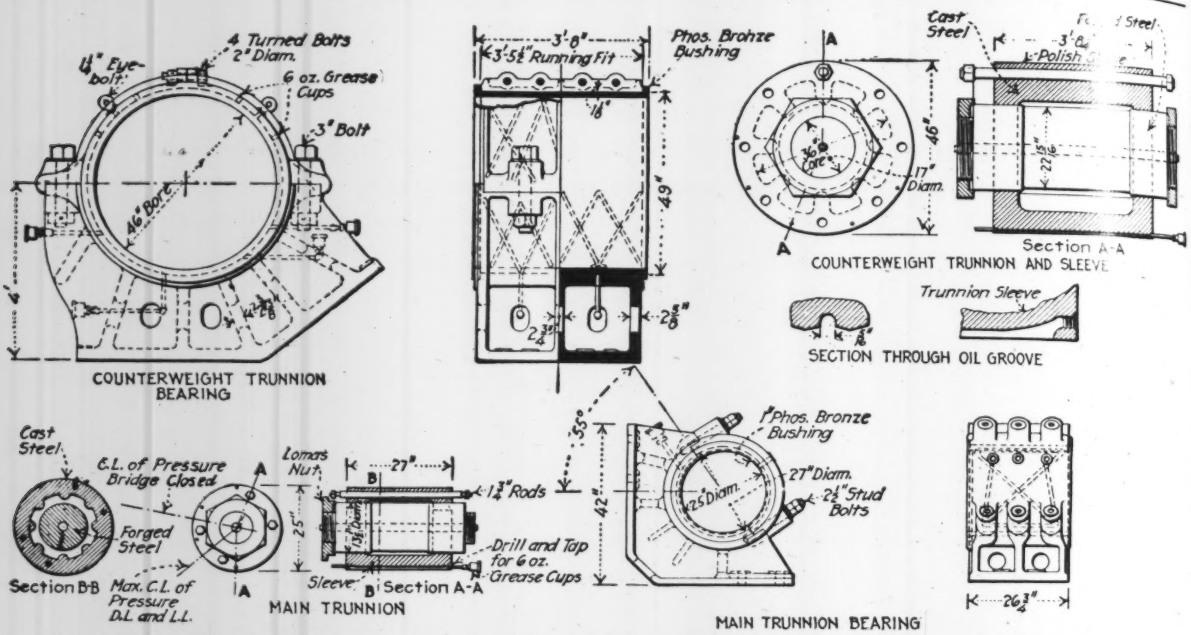
TOWER HAS CANTILEVER SUPPORT FOR COUNTERWEIGHT TRUNNION BEARINGS



PNEUMATIC BRAKE (SEE VIEW ON P. 1058)

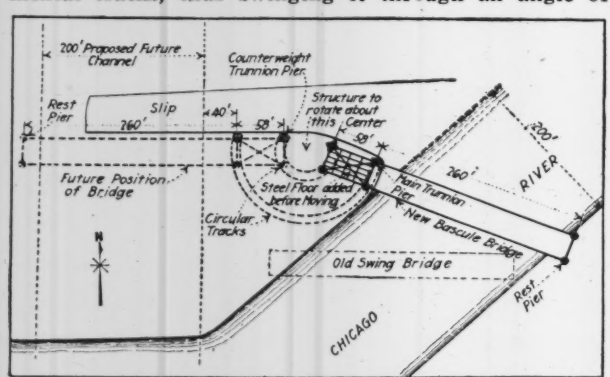


PNEUMATIC BUFFER CHECKS TRAVEL OF BASCULE



LARGE-DIAMETER TRUNNIONS AND BEARINGS OF BRIDGE AND COUNTERWEIGHT TRUSSES; HOLLOW CAST TRUNNIONS SEATED IN PHOSPHOR-BRONZE BUSHINGS REVOLVABLE IN THE BEARINGS

Removal of the bridge to a new site is a possible problem, as the proposed straightening of the river would put the channel about 400 ft. west of the present trunnion pier. A plan suggested by the bridge company is to shift the structure on conical rollers placed on segmental tracks, thus swinging it through an angle of



PROPOSED METHOD OF SHIFTING BASCULE BRIDGE TO NEW SITE

about 160° and transferring it to a trunnion pier on the east side of the new channel, as shown on one of the drawings. Hoisting engines and tackle would supply the necessary power.

This bridge was designed and built under the direction of A. S. Baldwin, former chief engineer (and now vice-president) of the Illinois Central R. R., and F. L. Thompson, the present chief engineer. They acted for the four railways which have joint ownership of the St. Charles Air Line R. R. Maro Johnson, assistant engineer, Illinois Central R. R., was in direct charge of construction. The design and plans for the superstructure were made by the Strauss Bascule Bridge Co. Substructure work was commenced in October, 1917, by the Foundation Co. and was completed in August, 1918. Fabrication of the steelwork and machinery was let to the American Bridge Co. and erection to the Ferro Construction Co. Erection was commenced in October, 1918, but in November it was interrupted by delays in receipt of material, work being resumed in February and completed in August, 1919.

Annual Report of Bureau of Standards

A review of the work of the national Bureau of Standards for the year which ended June 30, 1919, is given in the annual report of the Director of the Bureau of Standards at Washington. The report describes the functions of the bureau in connection with standards and standardization, and contains a chart and description of the several classes of standards dealt with. The director also gives a clear idea of the relation of the bureau's work to the general public, to the industries, and to the Government, and includes a special statement of the military work of the year. Brief statements are made upon practically all of the special researches and lines of testing completed or under way at the bureau. The list of these topics occupies 12 pages in the table of contents.

The bureau is organized in 64 scientific and technical sections and 20 clerical, construction and operative sections. During the year the bureau has issued 51 publications, not including reprintings, 36 of which were new and 15 revisions of previous publications. In the several laboratories of the bureau more than 131,000 tests were made during the year. The appropriations for the year, including special funds for war investigations, were approximately $3,000,000. A noteworthy event of the year included the completion of the industrial laboratory, in which will be housed the divisions having to do with researches and tests of structural materials. The building also includes a commodious kiln house for use, among other purposes, of the ceramics division in the experimental production of new clay products and for general experimental purposes.

The report comprises 293 pages, and may be obtained as long as free copies are available, by addressing the Bureau of Standards, Washington, D. C.

Machines for Handling Heavy Track Material

Small Gangs With Power- and Hand-Operated Devices Shift Rails, Ties and Frogs Rapidly, Cheaply and Safely

HEAVY weight of unit parts of modern railway track, and short supply and high cost of labor needed to handle such units, form conditions favorable to the increased use of machinery. This was pointed out in a paper on labor-saving devices presented at the annual meeting of the Roadmasters and Maintenance-of-Way Association, in Chicago. This paper was written by J. B. Baker, supervisor, Pennsylvania R.R., and an abstract of that part relative to the handling of heavy materials is given herewith.

Rail Unloading

For unloading heavy rails from cars a power device is practically imperative. One of these in common use consists of an air-operated derrick and boom, with rail hook. The air is obtained from the train line. A crew of six men is customarily employed. An attempt was made recently to eliminate two men by the use of a pair of hooks, one at each end of the rail, the hooks being so designed as to catch the rail whether lying on side, base or head. This did not prove to be a success, as a given length of lead to the two hooks would allow a variation in length of rail of only 2 ft., in order to obtain clearance to unload from a gondola car. Rails of shorter lengths would not lift over the side of the car unless a special short lead was used. Furthermore, when a rail was jammed against the end of the car it was necessary to move it endwise before applying the hook.

A hook that will release in midair is not desirable, on account of the likelihood of damaging the rail and injuring the workmen. Small steam derricks are being used, and operate faster than air unloaders, but Mr. Baker believes that they are more expensive to operate and maintain. Where rail is unloaded in reclamation yards, the magnet crane is most economical.

Rail-Laying Cranes

Where it is possible to obtain the use of track for the major portion of the day, the use of a power-operated rail-laying machine is economical. A machine of this sort will lift the new rail into track and travel over the newly laid rail at slow speed. The splices are placed on the rail and bolted up by an air motor, using air from the locomotive operating the rail derrick. Under heavy traffic it may be possible to obtain the use of track only for periods aggregating not more than two to three hours per day. Then the gang must be organized with a view to starting at once after the passing of the train, and making every minute count.

In this operation a small, hand-operated rail layer, consisting of a carriage and boom traveling on the opposite rail from that being installed, and lifting the rail by means of hand winches, is a real labor-saving device. On rail weighing as high as 125 lb. per yard, this machine with five men replaced 20 men handling the ordinary rail tongs. The old rail is thrown out several rail lengths ahead of the operation, and the new rail is set in by the machine at the rate of a little better than one rail per minute. This operation is usually no faster than that done by a competent gang of tong-men, but a speed can be maintained equal to that of the tong-men by using fewer men, while the operation by machine is undoubtedly easier on the men. Rails 60 ft. long and weighing 125 lb. per yard have been laid successfully with this device.

It is with a small gang that this machine appears most favorable. It has been found economical to apply a pair of splices to the far end of each rail, these being held together by means of only one bolt, loosely applied. Each succeeding rail is then laid by allowing the end to be inserted in the open end of the splice of the preceding rail. For insulated joints, there is a saving in time and labor if the joint is applied to two adjoining rails before the rails are placed, the two being lifted into track as one unit. This applies particularly to insulated joints having both side plates and a base plate.

Handling Ties, Frogs and Switches

Where ties are distributed by a work train equipped with a rail loader, the equipment should include a hook which will unload from an open car and release in midair. Unloading ties in yards, to be stacked for storage, can be done to advantage by power-operated davits set in the stake pockets of the cars and fitted with hooks and chains for handling one or more ties. For unloading from box cars, Mr. Baker suggests the use of a trolley hoist on a light I-beam; one end of this beam is clamped to the roof, the other end extending through the door and being supported on an A-frame outside.

The handling of frogs and switches in and out of cars should be done by an overhead lifting device of the type which best suits the nature and volume of the work. A small hand derrick, or a differential hoist on an I-beam supported on A-frames, is useful where such material is handled only occasionally. The latter arrangement can be made to handle material in and out of box-cars. In reclamation yards or storage yards, a hand derrick on a four-wheel truck traveling on a standard-gage track has been found a labor saver, as with it frogs can be unloaded from cars and trucked to storage piles or the shop by two men. An overhead trolley in a shop where such material is repaired is almost essential, as the real economy in the reclamation of frogs and switches depends largely on the labor charge incident to such reclamation. Where the use of locomotive cranes or cranes of the gantry type is justified by the volume of the material handled, such cranes should be used.

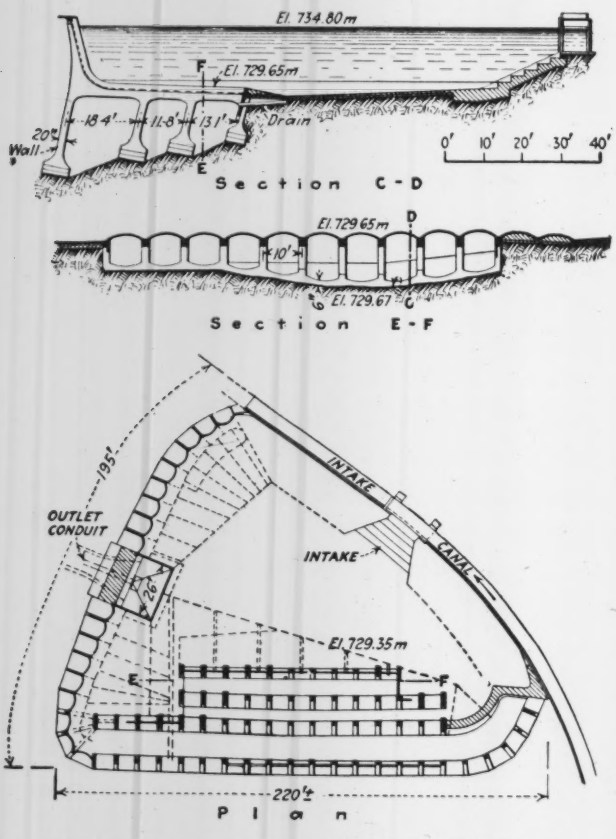
American Cement Exports Not Excessive in 1919

Although the amount of portland cement exported from the United States in 1919 will probably reach a value in dollars greater than ever before, the amount of cement exported is not greatly different from that exported at any time during the war, and is not as high as in the first year of the war. In the first three-quarters of 1919 the exports totaled 1,780,612 bbl., valued at $5,525,351, which is just about the average amount exported in the past five years. The imports of portland cement have practically ceased, with the exception of a small amount from Canada. The exports are largely to South America. During the first three-quarters of the current year the greatest amount has been shipped to Brazil, the second to Cuba, the third to Argentine, and the remaining countries are in the following order: Mexico, Panama, Peru, Colombia, Chili, Dominican Republic and Madagascar.

Reservoir Floor Partly Supported on Concrete Arches

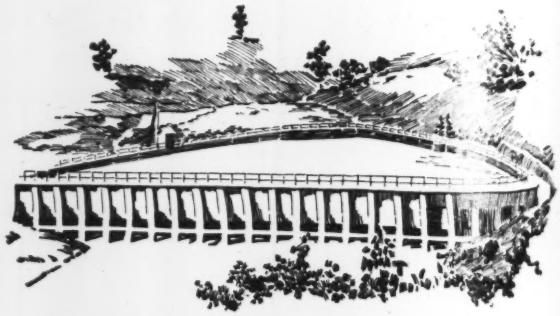
Built on Side Hill for Simplon Tunnel Power Plant—Walls on Two of Three Sides Are Also Concrete Arches

POWER for part of the Simplon canal train operation is generated by a hydro-electric plant on the Rhône River at Massaboden, Switzerland, which was built for the construction machinery for the tunnel and revised for permanent train operation. In the revision there was built a reservoir of very peculiar shape and design, drawings of which, taken from *Le Génie Civil*, of Oct. 11, 1919, are reproduced herewith.



DETAILS OF RESERVOIR FOR SIMPLON TUNNEL POWER PLANT

The outstanding feature of the reservoir is the fact that, as it is built on a side hill, nearly half is an elevated structure of reinforced-concrete arches, in which the bottom and sides form an integral structure supported on rows of columns. As shown in the plan, the reservoir is triangular, with sides of about 220, 195 and 200 ft. Along the upper side runs the feed canal from the Rhône, with a reinforced-concrete L-shaped retaining wall separating it from the reservoir. The other two sides of the reservoir are formed of continuous arches of about 10-ft. span, backing on buttresses which extend around to the bottom of the reservoir to form there the stringers on which the arches of the elevated floor also rest. This whole arch system is carried through the stringers on sloping posts under the buttress beams, as shown in the cross-section. The outlet tunnel is through one of the arch walls, as shown in the plan. The incoming water is controlled by a gate in the canal at the head of a paved step section on the side slope on which the canal runs, as shown in the cross-section. Drains are placed upon the concrete floor of the solid part of the reservoir.



MASSABODEN RESERVOIR; INTAKE CANAL ALONG RIGHT REAR SIDE

A Discussion on Superelevation of Highway Curves

THE question of how much superelevation should be given paved roadways was discussed at a recent meeting of engineers in the West, and the following was contributed by one of those present:

"Since the tendency to tip in rounding a curve varies as the speed, the height of center of gravity and width of tread, no one superelevation, of course, will meet all requirements as to different speeds, type of vehicle and loading. Moreover, no two individuals under same conditions of load and vehicle appear to desire the same speed. In the case of a railroad, with fixed width of tread, practically fixed center of gravity and with a comparatively narrow variation in speed limit, the problem is quite simple, while on highways it is very complex. No railroad company would for one minute consider operating trains without superelevation of the rails. Why, then, should highways with greater variation in all factors of safety be permitted to be built without superelevation?

"On a certain section of highway, before the concrete pavement was placed, traffic had built up a superelevation of 36 in. in 18 ft. on a curve of 80-ft. radius. This resulted from the erosion of the inside edge by the traffic and the forcing or throwing of materials to the outer edge. The concrete pavement laid on this curve has a superelevation of 24 in. in 18 ft. and at a speed of 15 miles per hour rides very easily and seems in nowise excessive. Three other curves, each of 1000-ft. radius, in another locality have a superelevation of 15 in. on a 20-ft. pavement and are regarded by the traveling public as particularly safe and comfortable.

"Experience would indicate that where a tangent meets a curve the run-off should be entirely on the tangent. The grade on the inside edge should be kept constant and symmetrical and the center and outside grade changed to meet the required superelevation. Except in cases where the entire superelevation is less than 6 in. the center line profile should not be depressed. Although the instances cited above may be more than ordinarily required, it is nevertheless suggested that in general the amount of superelevation should be increased."

Milwaukee Sewage-Testing Station: Experimental Data

Activated-Sludge Treatment Rate Doubled by Prescreening—Dorr Thickeners Reduce Sludge Moisture to 98.5 Per Cent.

RESULTS of sewage experiments with fine screens, activation tanks and Dorr thickeners at the testing station of the Sewerage Commission of Milwaukee are recorded in the annual report for 1918. Experiments with fine screens indicated that whereas the volume of liquor treated per square foot of fine screen wet area increased with increasing losses of head, the pounds of screenings removed per million gallons treated decreased. The screen used resembled the Hamburg type but the screenings are swept off by a system of revolving brushes. It is made of 38 bronze plates, 32 x 18 in., each plate having 28% of open space in the form of slots $\frac{1}{8}$ in. wide. The screens were made by the Chain Belt Co. and installed for two purposes: To protect the aeration tanks from the coarse débris, which has proved

SEWAGE SCREEN RESULTS WITH VARYING LOSSES OF HEAD

Loss of Head	2 In.	4 In.	5.7 In.	6.7 In.
Sq. ft. wetted area	22.7	26.2	27.5	28.1
Million gallons treated daily	3.7	7.0	8.0	12.8
Gallons per sq.ft. wetted area	115,200	161,100	202,300	318,700
Pounds of screenings collected daily	3,498	4,500	5,181	5,548
Average per sq.ft. wetted screen area	1,079	1,032	1,320	1,382
Average per million gallons	953	655	650	441
Per cent. moisture in drained screenings	88.1	89.0	88.5	88.5
Per cent. rough suspended matter removed	6	9	6	5
Total suspended matter in sewage, p.p.m.	239	219	249	250
Coarse suspended matter in sewage, p.p.m.	193	157	143	127
Coarse suspended matter in screened liquor, p.p.m.	181	149	134	119

to be a serious detriment in previous experiments, and to get data on the relative volumes passed, quantity of suspended matter removed and losses of head developed by slots of several sizes.

The screened effluent passes into aeration or activation tanks having liquiid areas of 284 sq.ft. and containing filtros plates guaranteed by the maker to pass, when dry, 10 cu.ft. of air per minute under a pressure equal to 2 in. of water. One of the 15-ft. tanks had 64 plates and the other 48. The two 10-ft. tanks were similarly equipped. From experiments in 1916 and 1917, standards of 90% removal of bacteria, 95% of suspended matter and 72 hours of stability of effluent were adopted. The activated-sludge tanks were found to be able to meet these standards, at rates of 7,000,000 gal. per acre daily. The 1918 experiments were for the purpose of doubling the rate. Both 15 and 10-ft. tanks, running at the high rate, met the standard with a margin to spare, 99% plus of the suspended matter being removed, 95% plus of the bacteria and the stability was 120 plus and 105 plus in the 15-ft. tanks and 100 plus and 95 plus in the 10-ft. tanks. The screens enabled the rate to be increased to 16,500,000 gallons.

Settling tanks equipped with Dorr thickeners received the mixed liquors discharged by the aeration tanks. Important features in these tanks are as follows: (1) Power-driven mechanical scrapers which travel over the surfaces of the slightly cone-shaped tank bottoms and force the heavy, settled sludge out through a central drain; (2) air lifts which raise the heavy discharged sludge to measuring devices or "tipping trays;" (3) weir troughs by which the purified sewage is drained off from the surfaces of the tanks and discharged into measuring boxes.

The thickeners were installed to serve as settling basins for separating purified sewage from sludge, and to condense the sludge. As the effluent contained less than 5 p.p.m. of suspended matter and the sludge, at times, contained less than 98.5% of moisture the thickeners were considered to have given good service.

The aeration tank effluents entering the thickeners were applied at an approximate rate of 1000 gal. per square foot of surface area daily. At this rate, the tanks contained a layer of heavy sludge at the bottom of from 2 ft. to 3 ft. thick, and the top of the sludge blanket was about 8 ft. above the bottom. The scrapers made one revolution in four minutes and moved the sludge from the outer edge to the center in ten minutes.

Analyses of the sludge discharged show that it varied in moisture from 97 to 99.5%. The moisture content is affected to a large degree by the quantity and character of the sludge in the mixed liquors which enter the tanks and by the manner in which the sludge is drawn off.

When the aeration tanks contain much sludge, as, for instance, 25 to 30% (on one-half hour settling), the moisture in the sludge escaping from the thickeners will range between 97 and 98%; when the aeration tanks contain 15% or less of sludge, the thickeners will discharge sludges with 99 to 99.5% of water. If the sludge is drawn off rapidly, top water breaks through and raises the moisture by dilution. If the sludge is drawn off slowly and continuously, a layer of thick sludge 2 to 3 ft. deep remains on the bottom all of the time and prevents top water from breaking through.

When sludge is drawn off continuously at a rate of 13% of the sewage flow, the sludge will carry 98% (or less) of moisture. When the sludge is drawn off continuously at a rate of from 18 to 20% of the sewage flow, the sludge will carry 98.5% of moisture. When the sludge is drawn off continuously at a rate of from 30 to 35% of the sewage flow, the sludge will carry 99% (or more) of moisture, but when the sludge is drawn off at a rate of 50% of the sewage flow, the sludge will carry 99.5% or more of water.

Sooty air on Jones Island clogged the filtros plates. Most of it was removed by filtering through a layer of 12-oz. duck then through a layer of canton flannel and finally by passing through a Nash hydro-turbo blower.

Aeration by perforated black iron pipes was not a success, the holes in the pipes of the grids filling with rust within two days. Filtros plates set in iron containers and fed by black iron pipe lines were covered with sufficient rust in a few months to shut off the air. It is concluded that galvanized iron or some non-corrosive metal should be used to deliver air to the filtros plates.

T. Chalkley Hatton is chief engineer of the commission and W. R. Copeland chief chemist.

Toconce Pipe Line of Steel, Not Wrought Iron

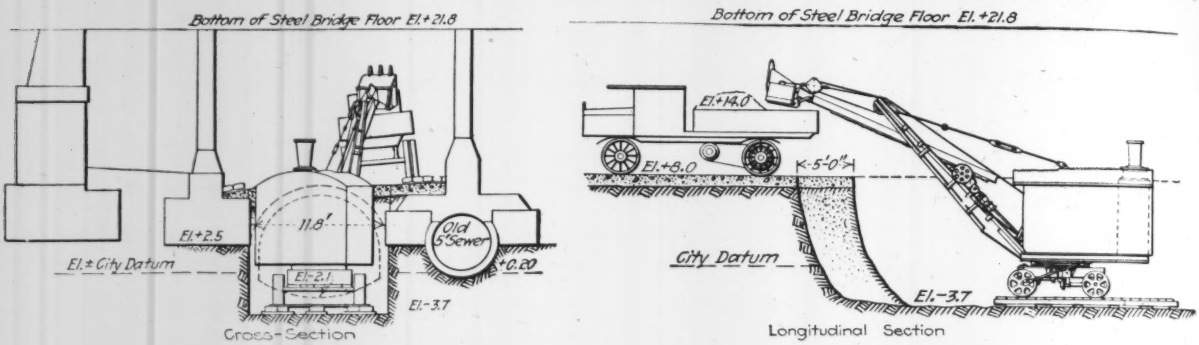
The Toconce pipe line, 98 km. in length, built by the Chile Exploration Co. to supply a copper mine and camp, as described in *Engineering News-Record* of Sept. 25, 1919, p. 593, was of steel instead of wrought iron, the latter description having been inserted through misunderstanding in the subcaption and opening lines of the article when it was being edited for publication.

Steam Shovel Digs Sewer Trench in Narrow Space

Clear Space Between and Head Room Under Existing Structures in Chicago Limited to Inches

By George C. D. Lenth
Assistant Chief Sewer Engineer, Chicago, Ill.

BY OPERATING a steam shovel on the bottom, trench for a large sewer was excavated in an unusually narrow space, and labor and time were saved, compared with hand excavation, in recent sewer construction in Chicago. In particular, the shovel was used to carry the trench under an overhead railway crossing where the head room was scant and whose column foundations had to be guarded with great care. These foundations were not disturbed nor were adjacent surface structures and close-by sewers and gas mains paralleling other parts of the work.



METHOD OF EXCAVATING TRENCH BETWEEN FOOTINGS AND UNDER FLOOR OF BRIDGE OVER STREET

The sewer to be built was of concrete having a horseshoe section 11 x 9 ft. On Elston Ave. it was located on a line 8 ft. west of the east street line. On the east side of the street is a large lumber yard with a high board fence, which it was necessary to keep in place. In the center of the street there are two street car tracks and between the car tracks and the sewer there is a 24-in. high-pressure gas main. The contractor had to maintain traffic on the west track, but the east track could be used temporarily for construction purposes. The total width of the street was 33 ft. and the location of the sewer and the necessity of maintaining traffic required the immediate removal of the excavated material. This was accomplished by motor trucks.

In Augusta St. the center of the sewer was along a line 13 ft. south of the center of a 66-ft. street. In the center of the street there is a 5-ft. brick sewer built 50 years ago, the flow line of which is approximately 0.2 ft. above Chicago city datum.

General Methods

Originally, the surface of the ground in the vicinity of this sewer work was between 6 and 7 ft. above datum. The soil below this plane is a fairly stiff blue glacial clay. Above the plane there is filling of various kinds. The average elevation of the streets, except through the subway under the Chicago & Northwestern R.R., is 11 ft. above datum.

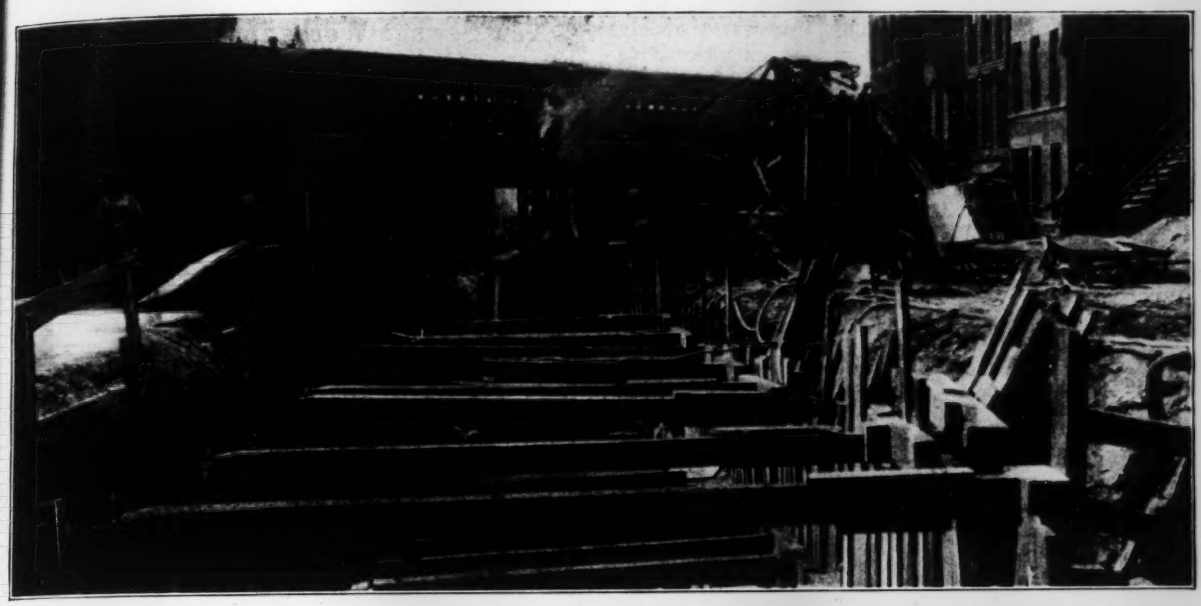
The contractor placed the steam shovel in the excavated ditch instead of on top of the ditch and used a self-propelled shovel provided with an 18-ft. dipper stick, so that the motor trucks on the street adjacent to the ditch could be loaded directly by means of the shovel. As shown by the accompanying sketch, the shovel dug itself down to the bottom of the excavation, which was 14 ft. wide at the bottom and 17 ft. wide at the top. Of the total excavation of 280 cu.yd. per day of eight hours 55% or 154 cu.yd. had to be entirely removed from the street and wasted. As the ditch was excavated it was thoroughly sheeted and braced so that there was practically no settlement of the adjacent ground.

The sewer was constructed of 1:2½:5 reinforced concrete, and was poured in three operations. The invert was built first, and allowed to set one day. Then the forms for the side walls were set, reinforcement placed, and the side walls poured, and after setting a few hours the arch forms were moved into position, the reinforcement was placed and the concrete poured. The reinforcement was steel wire fabric. The forms were collapsible, of 4-in. dressed and bevelled yellow pine bolted to structural steel ribs. The forms were 25 ft. long and were moved on a carriage running on tracks laid on the invert.

It was necessary to change the shape of the cross-section of the sewer where it crossed Elston Ave., so that sufficient space over the top of the sewer could be obtained for utilities. Here the form was made a box section, having a horizontal diameter of 11 ft., with a vertical height of 8 ft. Also, because the street car tracks could not be removed at the intersection of Elston Ave. and Augusta St., the steam shovel dug to the street car tracks and was removed while the crossing was dug by hand. In Augusta St. the shovel dug itself down along the south side of the street between the sidewalk and the existing 5-ft. brick sewer. In this way, very little hand excavation was necessary.

Subway Complicates Problem

Approximately 400 ft. west of Elston Ave. is a subway under the main line tracks of the Chicago & North Western R.R. This subway is 175 ft. long and consists of two roadways with a line of columns separating them and lines of columns along the curbs between the sidewalks and the roadways. The columns and retaining wall along the street line are supported on spread footings made of natural cement concrete, the bottom of which is 2.5 ft. above datum. Inasmuch as the bottom of the excavation for the sewer is 3.7 ft. below datum and the clearance between the footings is 12 ft., the work of constructing this section of sewer was



HEAVY SHEETING AND BRACING RETAINED BANKS AND ADJACENT STRUCTURES

hazardous as well as complicated on account of the limited space.

The elevation of the lowest part of the steel work of the subway is 21.8 ft. above datum and the elevation of the pavement in the subway is 8.5 ft. above, making a net clearance of 13.3 ft. The height of the motor trucks carrying away the excavated material was approximately 6 ft. above the street level.

The first operation of the contractor was to remove the granite-block pavement in the subway. This increased the clearance over the trucks approximately 6 in. Next he broke and removed the south half of the concrete foundation of the granite-block pavement. The steam shovel was further lowered in the ditch so that the wheels of the shovel were approximately 1 ft. above the outside of the bottom of the sewer or 10 ft. below the street level. This gave the contractor a clearance of 18 in. between the top of the boom of the shovel and the bottom of the steel of the subway. In excavating, extreme care had to be taken to prevent the settlement of the foundations of the subway, so that the work was closely sheeted and braced. Three tiers of 10 x 10-in. braces spaced 6 ft. apart were installed behind the shovel and one brace in front of the shovel on the lower tier so that at no time was there a greater distance than 12 ft. between the braces and then only when the shovel was operating.

The method of loading the trucks by means of the shovel, under the subway, was unique. The sewer was being constructed so that the digging face was to the west. Instead of digging the face, as is ordinarily done for the entire width of the trench, the contractor dug the south half 6 ft. in advance of the north half, the north half acting as a roadway for the truck. The length of the dipper stick and the clearance above the truck when partially loaded made it difficult to open the bucket and discharge the load. The operator was also unable to reach the forward end of the truck, so he would load the rear end of the truck and then place the dipper on the bed of the truck and with the crowder engine shove the dipper stick forward, pushing the material previously dumped into the front end of the truck. This operation was repeated until the truck carried its load of 3 to 4 cu.yd., place measurement.

The railway company and the city had engineers on the premises who took elevations on the foundations and columns, and during the construction and afterwards there was practically no indication of settlement.

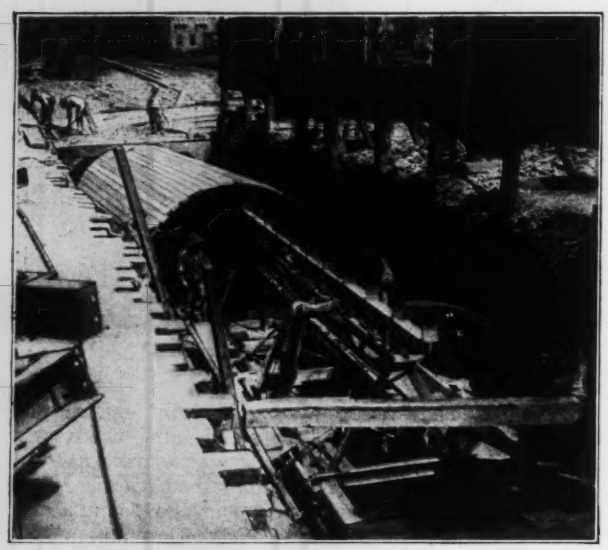
The invert of the sewer through the subway was

STEAM SHOVEL WITH BOOM CLEARANCE OF 18-IN. LOADING MOTOR TRUCK

heavily reinforced by means of steel bars, additional concrete was placed in the haunch walls, and the arch of this section was reinforced with rods instead of with wire fabric.

There was considerable discussion before the subway was reached as to the advisability of using the steam shovel. The engineers for the railroad company were inclined to the belief that the operations could not be carried on with safety. The engineers for the city were doubtful, and the contractor was of the opinion that,

on account of the labor conditions, this was the only economical method of construction. As an alternative to using the shovel, an estimate was made of the cost of excavating this trench by hand, which was $20 per foot, but the delay was such that it was considered inadvisable to expend this additional sum of money. The method used was entirely successful and only slightly slowed up the progress of the sewer construction. When the shovel reached the west end of the subway the sewer



ARCH RING FORMED ON TRAVELING CENTERS

was constructed along the center line of Augusta Street.

The small shovel was taken out of the ditch just west of the portal of the subway by means of cribbing and jacks. The balance of the excavation for the sewer is being done with a 70-ton shovel supported over the ditch.

The execution of this work was under the direction of Joseph Ryan, superintendent for the contractor, The Ryan Co., of Chicago. The construction is under the supervision of C. D. Hill, engineer, Board of Local Improvements, and the writer, with T. S. Ford, as engineer in local charge.

Wisconsin's New Drainage Laws

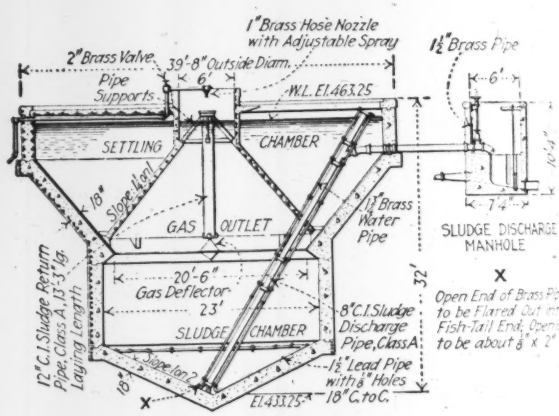
Two land-drainage laws were passed by the Wisconsin legislature during 1919, including the drainage district law, which is an improved form of the old law and covers the larger projects under the jurisdiction of the circuit judges. The second law repeals the old town, county and mine drain laws and gives the county judges jurisdiction over all the small drainage systems of their counties. Both laws give the state chief engineer, J. G. D. Mack, supervision over all drainage districts and all farm-drainage systems of more than 200 acres.

Mr. Mack has appointed E. R. Jones as state drainage engineer, and circulars are being sent out to engineers, attorneys and land owners to explain the steps necessary in the organization of drainage districts under the new law.

New Sewage-Works for Austin, Texas

SCUM or foam control device is a feature of the sewage-works put in operation at Austin, Tex., early in November, 1919. The plant consists of one 1,000,000 and two 2,500,000-gal. automatic float-switch, motor-driven centrifugal pumps on horizontal shafts; four circular reinforced-concrete Imhoff tanks with sludge beds formed by reinforced-concrete boards; a liquid chlorine dosing apparatus controlled by a connection with the venturi meter on the tank effluent outlet; and a brick-faced, tile-roofed pump house. Provision is made for trickling filters, which were omitted after the voters had twice defeated a bond issue designed to pay for both tanks and filters.

The scum-control device consists of a 12-in. cast-iron pipe, centered in the gas outlet, with its top about 12 in. above the sewage line and its bottom at about the level of the slots in the settling chamber. Both the top and bottom of the pipe are open, but at the bottom a gas deflector is hung to prevent gases from ascending


1" Brass Hose Nozzle with Adjustable Spray
2" Brass Valve
39'-8" Outside Diam.
1½" Brass Pipe
Pipe Supports
6'
W.L. El. 463.25
SETTLING CHAMBER
18" Slope Wall
GAS OUTLET
1½" Brass Water Pipe
SLUDGE DISCHARGE MANHOLE
20'-6" Gas Deflector
23'
32'
Open End of Brass Pipe to be Flared Out into Fish-Tail End, Opening to be about 8" x 2"
12" C.I. Sludge Return Pipe, Class A, 15'-3" Lg. Laying Length
8" C.I. Sludge Discharge Pipe, Class A
SLUDGE CHAMBER
Slope Iron
1½" Lead Pipe with 8" Holes 18" C. to C.
El. 433.75

SCUM OR FOAM CONTROL DEVICE FOR IMHOFF TANK AT AUSTIN, TEXAS

through the pipe. Water under pressure will be sprayed into the top of the cast-iron pipe, should foaming occur, to break up and carry down the scum and floating sludge. So far as we know, the Imhoff tanks at Austin are the first to be equipped with this foam-control device.

The effluent will be discharged into the Colorado River. The sludge will be dumped on land.

The plant was designed by Prof. John H. Gregory, Baltimore, Md., who is serving the city as consulting engineer on sewage-disposal matters.

It was built on the cost-plus plan (5% on machinery and 10% on balance) by A. J. Potts, C. E. Moore and W. H. Prentice, Waco, Tex., with T. J. Palm as superintendent of construction. C. E. Leonard is city engineer.

The contract cost, including contractor's fee, was about $97,500. Additional outlay by the city for engineering, keeper's house and various accessories will bring the total cost up to about $110,000, not including land or outfall sewer, the latter having been built some time ago. The excavation for the tanks, and pump house required no sheeting and scarcely any concrete was wasted because of irregularities encountered in the excavation.

Municipal Garbage-Reduction Results at Columbus, Ohio, in 1918

GROSS profit from the municipal garbage-reduction plant of Columbus, Ohio, for the year 1918 was $26,667, with no allowance for capital charges. The amount of garbage received in 1918, according to the annual report of Thomas D. Banks, superintendent, was 15,629 tons, besides 60 dead horses and seven other large animals. Assuming a population of 220,000 the average amount of garbage per capita for the year was 138.44 lb. Average daily collections ranged from 39.19 tons in January to 62.77 tons in August, and averaged 49.93 tons.

OPERATION COST OF COLUMBUS GARBAGE-WORKS

		Per Ton Garbage
Supervision	$ 4,123.50	.26381
Clerk hire	1,213.50	.07763
Labor for operation	31,601.43	2.02184
Office supplies	89.87	.00574
Fuel	21,291.81	1.36264
Clothing	27.62	.00176
Mechanical and motor vehicle supplies	2,314.62	.14168
Other supplies	171.74	.00109
Chemical supplies	6,558.78	.41962
Transportation of employees	9.50	.00061
Telephone and telegraph	67.64	.00432
Insurance	19.25	.00123
Light and power	2,498.46	.15984
Other contractual services	171.00	.01094
Maintenance of buildings	23.59	.00151
Maintenance of railway tracks	3,362.77	.21515
Maintenance of equipment	12,040.64	.77746
Other maintenance	35.18	.00225
Total	$85,620.90	$5.47

The total yield of grease for the year was 676,407 lb., which was at the rate of 2.164% of the weight of garbage, or 43.28 lb. per ton, and brought $79,492.45 revenue. The tankage amounted to 1603.3 tons, or 10.258%, or 205.16 lb. per ton, and was worth $31,708. There was a revenue of $878 from 105 hides and of $211 from miscellaneous sources. The operating and maintenance costs are shown in the accompanying table.

The analysis of the tankage showed: Moisture, 3.39%; ammonia, 3.77; potash, 1.08; B.P.S., 7.94%. The grease showed: Moisture, 1.96%; impurities, 0.55; unsaponifiable, 4.57 per cent.

The Ohio Health-District Act

FOR purposes of local health administration, the State of Ohio has been divided by a 1919 statute into "general health districts" which, excluding cities of 25,000, having a sanitary administration satisfactory to the Department of Health, are as a rule coëxtensive with counties. The exceptions noted are known as municipal health districts. Two general health districts may unite, or one of such districts uniting may be a municipal health district located within the boundaries of a general health district. In each general health district, except those that have united with a municipal district, the law provides for a health board of five members, serving without pay but reimbursed for their expenses. The boards include one farmer, one attorney and two physicians. The members of these boards are selected by district advisory councils consisting of the mayor of each municipality not a municipal health district and the chairman of each township board of trustees within the district.

Each general health district has a full-time health commissioner, selected by the district health board from an eligible list certified by the state Civil Service Commission. Each general health district must appoint, on recommendation of the district health commissioner, a full-time public health nurse and a clerk. The district board must provide a health service in each city within the district and appoint a deputy health officer therefor. Provision is made by the statute for laboratory and necessary services and employees in each district and for each municipality within the district. In general, all employees of health districts are under the state Civil Service Commission. General health districts complying with the law to the satisfaction of the state Commission of Health are entitled to reimbursement by the state of half their expenses, up to state payments of not over $2000 a year.

The new plan insures Ohio about a hundred health districts, with as many full-time health officers, in place of the previous 2141 health districts, with only five full-time health officers. Dr. Allen W. Freeman, Columbus, Ohio, is state health commissioner.

Supervision of Water-Treatment Plants in Michigan

ALL water-treatment plants supplying water for domestic use in Michigan are required to submit by the tenth of each month a report on the daily operation of the plant for the previous month. This is done in accordance with a resolution of the board, effective Jan. 1, 1916. As soon as practicable after the reports are received, Edward D. Rich, state sanitary engineer, states, they are carefully examined by an assistant, who also writes a letter to the person or laboratory sending the report, offering such suggestions as may seem advisable. Furthermore, this assistant "aims to visit each plant at least once a year and much oftener, of course, if serious troubles arise."

The results of this method of supervision, Mr. Rich states, are gratifying, "particularly in insuring fairly good attention to the chlorination plants which at first were expected by the local authorities to work without much, if any, attention." Mr. Rich adds, "I am firmly convinced that any attempt to operate a chlorination plant without laboratory control cannot possibly result in getting even a fair degree of efficiency out of the apparatus."

The State Board of Health supplies water-works plants with two forms for making monthly reports on operations; one for combined filtration and chlorination plants, and one where chlorination alone is practiced. The form for complete treatment plants is 11 in. high by 17 in. wide, and it is folded to a size of 8½ x 11 in. It gives for each day the total gallons filtered and other operating data, including rate of application of chemicals, and results of physical, chemical and bacterial examinations. At the foot of the blank, space is provided for reporting the average results of analysis of the chemicals used during the month. Space is provided for additional information, and there is a blank form for swearing to the report before a notary public.

The form for reporting operation of water-disinfection plants is 8½ x 11 in. The daily report covers pumpage in gallons, the amount of liquid chlorine or hypochlorite, as the case may be, used in pounds per day, and the available chlorine in parts per million; turbidity of the raw water, and oxygen consumed in raw water; together with bacterial analyses substantially as already outlined as regards the other form. A note at the foot of the blank gives the following instructions: "In case the flow of the sterilizing agent

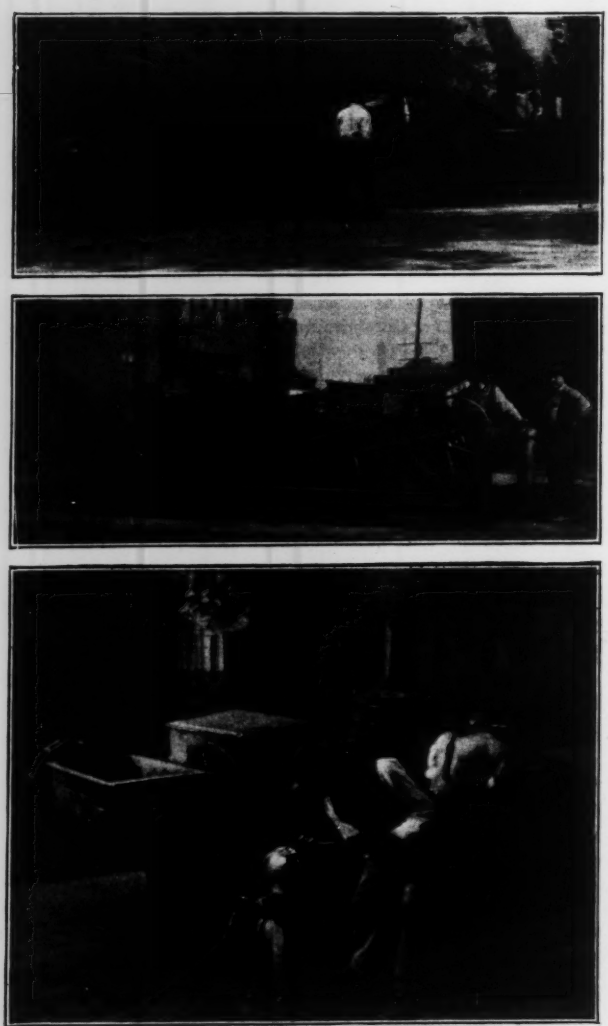
is discontinued for more than 24 hours, it is obligatory that this department be notified immediately, stating the reasons therefor, and giving an estimate of the time that the apparatus will be out of use."

The report form for water-treatment plants recently adopted and put in use by the State Board of Health of Wisconsin was reproduced in *Engineering News-Record* of July 24, 1919, p. 189.

Light, Portable Asphalt Plant for City Street Patching

Pug Mill Attached to Tandem Roller for Mixing—Portable Sand, Stone and Bituminous—Material Heaters

ASPHALT pavements are patched by means of a light portable asphalt plant by the street department of Reading, Penn. Having all the stages of manipulation which are ordinarily used in stationary plants, only on a smaller scale, it is claimed that the patches made by this plant are practically as good as those made from material hauled from permanent plants.



GENERAL ARRANGEMENT OF PORTABLE ASPHALT PLANT, WITH SIDE AND TOP VIEWS OF PUG-MILL ATTACHMENT

It is believed that the apparatus will be very useful in small cities where, on account of the small yardage of asphalt pavement, large stationary plants are not practicable.

Most of the plant which is used is ordinarily owned by city street departments. It consists of a tandem roller with mixing attachment, a small sheet-iron oven for heating sand and stone, and an ordinary asphalt- or tar-heating kettle. The arrangement of the plant at a conveniently located street intersection is shown in the general view.

The small sand heater shown in the general view is arranged with two compartments, with a grate beneath for a fire. Each compartment holds about 1 yd. of sand or stone. It is found possible to dry the materials with this device and heat them to a sufficiently high temperature. To arrange the tandem roller for this work, a small pug-mill is attached to the rear by lengthening out the frame. The side and top views of this are shown in the illustration. The small power sprocket is connected to the shaft of the engine in its free position, and when the roller is moved from one location to another the chain is removed from the sprockets.

To operate the plant, it is located at a convenient place adjacent to considerable patching, and the necessary sand and stone are dropped at the side. The heaters are then started and the materials brought up to the proper temperature for mixing. Just before mixing is started, a fire with kerosene oil is built in the pug mill which raises it to a temperature which will not cool the materials too much. When everything is in readiness the small stone for the binder course is put in and the bituminous material is added. About six pails of stone to one of asphaltic cement are used in the binder. When the mixing is properly done, a trap door at the bottom of the pug mill is opened and the mixture falls ready for placing in the patches.

Patching the street follows the usual method, the binder being placed in position and tamped, after which the sheet-asphalt covering is placed and rolled with the tandem roller.

Splitting and Relaying Granite Blocks

Old granite paving blocks at Nashville, Tenn., are being taken up, split and set in cinder concrete, and the joints are being filled with pitch, at a total cost of $2 to $2.10 per square yard. The original blocks were 8 to 13 in. long, 3½ to 4 in. wide and 6 in. deep. By the splitting crosswise, blocks with a new face, generally 4 x 6 in., and with a depth of 5 in., are obtained. The cinder concrete is mixed 1 : 2½ : 5 and placed dry to a depth of 2 to 3 in. on an old concrete or macadam base, the thickness varying according to inequalities in base surface. After the resplit blocks have been set, a garden hose is used to wet down the concrete. A mastic filler is used instead of cement grout, because the blocks were originally jointed with pitch. This cinder concrete, says W. W. Southgate, city engineer of Nashville, gives a resilient cushion, at the same time affording a matrix for the blocks. The city supplies all the material, and the labor is performed by contract. The contract price for splitting and redressing the blocks is 90c. per square yard and for resetting the blocks, mixing and placing cinder concrete, and pouring the joints, 45c. per square yard. The material for the cinder concrete cost 45c. per square yard, and for the joints cost the city 30c. per square yard.

SOCIETY SERVICE

A Section Dealing with the Results of Teamwork by Technical Men

Energy and Accomplishment in Philadelphia

The Philadelphia Association of Members of the American Society of Civil Engineers held a special meeting at the Engineers' Club, Philadelphia, Nov. 22, for the purpose of reviewing and discussing the final report of the Committee on Development to the Board of Direction of the parent society and to prepare for action in support of the measure when presented to the society by the board at the annual meeting to be held in New York next January.

The Philadelphia Association early this year created a local committee on development for the purpose of determining the attitude of the membership toward development projects, and of formulating its own policy in certain and definite recommendations. The subject was divided into five parts and subcommittees were formed to consider each part and report their findings and recommendations to the development committee for incorporation in that committee's report to the association. The committee meetings were held weekly and meetings of the association were held each month from January to November, except the months of July and August.

The report of the committee on development of the society includes, with few exceptions, the recommendations outlined in the report of the committee on development of the association. The association, therefore, voted unanimously to adopt the former and took definite steps to place the whole weight of the association's membership in its support at the annual meeting next January and thereafter until final action had been taken by the society.

By unanimous vote an executive committee of seven members was created to conduct a campaign in behalf of the proposed development. It is the intention of the committee to form teams of five or ten members headed by a captain, the members of each team to make a personal canvass of the members of the American Society of Civil Engineers in their vicinity and secure from each member, if possible, his support of the measure at the annual meeting and thereafter until a final vote is taken.

The tendency in some quarters to subordinate engineering to art and architecture as evidenced by the appointment of architects to design and supervise the construction of a number of important bridges was brought before the meeting and elicited a very spirited discussion which resulted in the association adopting the following resolution, which was voted to be sent to the Governor of the state, the mayors of all cities in the state and to the county commissioners of all the counties of the state:

"Whereas, in the design and erection of bridges and other similar public structures, involving fundamentally strictly engineering questions, there is a widespread tendency to subordinate engineering to art and architecture, and,

Whereas, the formation of commissions and the selection of the personnel to have the direction of the execution of these works is now under consideration by state, county and municipal authorities,

"Therefore, be it resolved, that the Philadelphia Association of Members of the American Society of Civil Engineers earnestly directs the attention of the Governor of the state, the county commissioners and the mayors of cities in the state to the fact that safety to human life and the proper expenditure of public funds requires that the design and erection of such structures be under the responsible charge of competent and experienced civil engineers, especially skilled and trained for that class of work."

A request from the Engineers, Architects and Constructors' Conference for the support of the bill to create a national Department of Public Works was presented to the association for its consideration. As very few members had any knowledge of the bill it was voted to postpone consideration until the January meeting.

The meeting was well attended, and while not the most notable in the number of members present was by far the most enthusiastic held for some time. The Philadelphia Association seems determined on a progressive development of the society and announces that no effort will be spared to carry that determination to accomplishment. The broad scheme of development is first to be secured, the details of expansion to be considered after the larger object is accomplished.

On What Shall Committees Work?

Now that the season for engineering society activity has arrived, attention to very definite, constructive lines of work by capable committees is decidedly in order. The Duluth Engineers' Club has acted on this principle in its assignments, as is indicated by the following subjects for special committees: Employment; engineering unity; promotion of the Babcock good roads amendment of the state constitution; civic relations; study and recommendation of action on proposed legislation, with subcommittees on patent office, mining on the public domain, national budget for the United States Government, national scientific research and national water-power legislation; dye legislation; forest-fire menace. Perhaps of the most significance, in that it is specific concerning an individual engineer, is a committee to obtain the appointment of W. H. Hoyt to membership on the Board of Regents of the University of Minnesota.

Canadians Active in Professional Welfare

The British Columbia Technical Association at its general monthly meeting, Nov. 17, in Vancouver, received satisfactory reports on various phases of its activities, and took up new plans for future action. The association has taken an active part in endeavoring to improve the status and salary grading of technical men in the Dominion civil service, and for several months past has been in constant correspondence with the authorities at Ottawa regarding the matter. It has taken similar action with regard to the regrading work of the provincial Civil Service Commission. Committee reports presented to the meeting indicated that a committee of the provincial Civil Service Commission then in conference with the regrading authorities did not contain a representative of the technical men in the service. It was made evident to the members present that all classes of employees in the provincial serv-

ice, except the technical, were in position to be assured of proper grading. Consequently, a delegation was appointed in the meeting, and left for Victoria on the following day to interview the Civil Service Commissioner on the matter.

The proceedings included a discussion on the minor parts which engineers and other technical men have taken in the public matters of the locality—a laxity resulting in the general expenditure of public money on engineering and other technical work by nontechnical men. Following the discussion a public service committee was created and given instructions to promote and encourage a greater interest in municipal, provincial, and Dominion Government affairs among technical men.

LETTERS TO THE EDITOR

Comment on Matters of Interest to Engineers and Contractors Will Be Welcome

Mr. Baker's Railroad Plan

Sir—I have been much interested in Mr. Baker's article on the railway situation. He of course is by no means alone, nor the first to recognize that the efficiency of our railroads in the past is due to the executive officers and men of the railroad organization; even the Plumb plan does that.

However, he and all the other proposers of various plans attempt to set up new machinery for control and regulation. We all of us admit the need of more intelligent control, and the modification in some respects of the laws, but is there any use of setting up a lot of new machinery to administer the laws? Isn't the whole or nearly the whole trouble with our railroads the fault of the human element which administers the laws and supervises the regulation, rather than with the laws themselves? If we cannot find men to regulate the railroads under the name of the Interstate Commerce Commission, are we likely to have them under the name of a national Board of Transportation or national Board for the Administration of Altruism?

I agree with Mr. Baker that there should be some regulation of issues of securities, but that is not new, and does not need a new board or commission. It seems to me that Mr. Baker's plan, while differing in details, is built on pretty much the same principles as the Plumb plan and while theoretically calculated to produce good results will only do so if the human element in its administration is honest and competent.

It is not difficult to imagine, with a Government guarantee, that the directors representing the stockholders would be quite indifferent to the manner in which the property is managed; the employees would desire to make the greatest profit at the expense of the public or, on those roads where no surplus is earned for distribution as a bonus, increasing their pay as compensation.

I have yet to see any hope for deliverance from Government operation or ownership in any of these compromises. The railway organization as it existed before the war, in spite of charges of gouging, robbery and so forth on the part of a small minority of the bankers, officers and employees, produced the best results in the world—with few exceptions, as good and comfortable passenger service and better and cheaper freight service.

Why, then, not leave it alone and try to improve the regulation? Make the latter national. Pass the few laws necessary based on sound economic principles if this is possible, and strengthen the Interstate Commerce Commission. Then, if the latter is composed of fearless, courageous, intelligent men, let's go to it. If we can't achieve this, there is little hope for anything but straight Government operation as well as ownership.

F. LAVIS,
New York City. Consulting Engineer.

What Will Engineers Pay To Improve Their Status?

Sir—In reading over the letters you have received on "What Will Engineers Pay To Improve Their Status?" I am somewhat disappointed at the attitude expressed. In the present state of the world's unrest there seems to be a premium placed on manual labor, and education is discounted. This is a condition which I believe was created by the great scarcity of labor during the great war and is a condition which sound reason argues will not last. The nation is held in the grip of a vast wave of discontent. What is the cause of this discontent? Is it not because everyone is trying to get for himself a little more than his fellowmen—in other words, selfishness, pure and simple? The laboring man is being paid far more now than he ever was before, yet he is spending all he makes, and not entirely on the necessaries of life, and is clamoring for more—yet more. If the laboring man is worth what he is getting now, then surely the scale of the professions should be greatly increased. But will this tend to remedy conditions? It is an endless chain. As wages go up, cost of manufacture, cost of construction, cost of living goes up.

It is time for the educated men, the men with broad vision and sound common sense, to come to the front. Let us still be patriots, forget "self" for a little while and bend our endeavors to the common good. Let us show that sound public opinion is against the radicalism of the unions. One finds the greatest discontent among the uneducated—the untrained. We have not heard much from the "captains of industry"; they have been content to raise the wages of the working man because they have been able to raise the price of commodities and realize the same, if not an even greater profit. Is not this where the fault lies? Shall we let ourselves be stampeded by the selfishness of others who know no better, or shall we try to strike at the root of the evil?

EUGENE T. CRANCH,
Port Arthur, Tex. Sanitary Engineer.

Nature Confirms Engineers' Arguments

Sir:—With reference to the American Falls dam noted in *Engineering News-Record* in the editorial on p. 718, Oct. 16, 1919: The dam will not be a record breaker so far as the structure itself is concerned, but a dam 90 ft. in height will create a storage capacity of 3,000,000 acre-ft., which will, I believe, make it the largest reservoir in existence. The great expense is due to right-of-way complications, it being necessary to move the town of American Falls and to flood about 70,000 acres of land. Although the land is not in a high state of cultivation, it will doubtless cost a considerable amount. In addition, the proposed structure will destroy the usefulness of power devel-

opment of the Idaho Power Co. However, on account of the enormous capacity created, and the very large acreage that will be brought into cultivation by the use of the water for irrigation, there can be no doubt that the construction is fully justified.

In reference to the progress of this project: A meeting was held Nov. 24 in Idaho Falls at which A. P. Davis, director, and F. E. Weymouth, of the United States Reclamation Service, met with Gov. D. W. Davis and W. G. Swendsen, state commissioner of reclamation, and representatives of all the irrigation interests that would be affected by the construction of the reservoir. Recommendations, in a report of a committee of the interested parties, were unanimously adopted, and the committee was instructed to proceed in accordance with them. The report recommended that that United States Reclamation Service submit a form of contract covering the work, that each organization make a careful determination of its needs for storage based upon a possible cost of $10 per acre-foot, and take immediate steps to secure the necessary funds; that contracts be closed quickly so as to expedite right-of-way and other negotiations and preparation of places for construction; that the state commissioner of reclamation be requested to secure, if possible, an assignment of filings made last May by I. B. Perrine, acting for the Twin Falls-Bruneau Co., to the Secretary of the Interior. There is great hope that the contract with the Government will be signed in the near future and the work can be in full swing next season. While there is only about 1,000,000 acre-ft. required by the companies which have filed applications with the storage committee, it is hoped that, once the work is begun, the immediate demand for storage will be sufficient to warrant construction to the full 3,000,000 acre-ft. capacity.

BARRY DIBBLE,
Project Manager, United States Reclamation Service,
Burley, Idaho. Minidoka Project.

Blames "Engineering Aristocracy" for Present Status of Technical Men

Sir—I have read with considerable interest the statement of the American Association of Engineers as to the feeling of the officers of that body in regard to the principles which should control organizations of engineers. The last paragraph of this statement, which reads as follows, "The American Association of Engineers through its board of directors who have signed this statement, recognizing the many fundamental differences between the principles and objectives of the trade union and of an organization of professional men, express the opinion that an engineer cannot subscribe to the tenets of the above," is particularly interesting. These questions are

1. Why is an engineer an engineer?
2. What is a union and what are the purposes of union organization?
3. What is an engineering association or an engineering society as we know know these institutions?

Answering the first of these questions as briefly as possible, it may be said without fear of intelligent contradiction that the primary object which a human being has in entering the engineering profession is the earning of an honest living. There is a great deal said about professional ethics and about the proper relation of the engineer to other groups in society, all of which is worthy of consideration. Fundamentally, however, engineers are like other individuals in this world in that they must receive a reasonable compensation for their efforts and that they make these efforts with the compensation which they are to receive very largely in mind.

The question as to what is a union can perhaps be best stated by paraphrasing Mr. Lincoln's famous statement and saying that a union is an organization of the men of any trade or profession, by the members of this trade or profession and conducted for and in the interest of the members of this trade or profession. Briefly, a union is a democracy. It implies the organization of the men of any group along democratic lines and the conduct of the organization by men selected from the rank and file of the organization and, finally, its conduct in the interest of the group. Naturally, organizations so formed will, at times, use methods which do not appeal to those who are exponents of politeness and believers in suave persuasion. A man must always use the tools with which he is familiar. The essence of such an organization is, however, democracy, and while it will proceed, as a democracy always proceeds, somewhat lamely at times and perhaps somewhat crudely, it nevertheless proceeds directly toward the goal of its ambition. Moreover, its principles are a direct reflection of the principles of its membership. Unions sometimes do resort to force, but those who decry such action overlook the fact that force is only used where needed to overcome opposing forces.

An engineering society is an organization in charge of an aristocracy. The subordinate engineer, like the vassal of old, pays his dues and proceeds to do as he is told by the aristocrats of the profession, who dictate the policies of the organization, lay down systems of professional ethics, which work very nicely for the control of the subordinate membership, and otherwise conduct the affairs of these societies in the interest of the aristocracy of the profession. I do not wish to be understood as objecting to the engineering societies. There are a great many men in this world who would rather be abused by an aristocrat than assisted by a pauper. Moreover, I agree with the gentlemen who signed the American Association statement that an engineer cannot subscribe to both the tenets of the ordinary engineering association and the tenets of a well regulated union. If he subscribes to the former, he admits his preference for aristocratic domination, whereas if he subscribes to the latter, he admits his preference for democracy. Neither am I surprised that the aristocratic leadership of the association should make it entirely clear that it does not favor unions. Aristocracy has never been aligned in favor of democracy, and it is not to be expected that it will so align itself in the engineering profession any more than it does anywhere else in the world's activities.

Nevertheless, I am of the opinion that the subordinate engineer will continue to hold that there is increasing demand for a really democratic organization of American engineers. The reason for this is plain enough. Though outwardly subscribing to such doctrines as that "reward should be according to ability, initiative and constructive effort," there are today very few engineering organizations where the salaries paid to the subordinate engineers bear evidence that the aristocracy

of the engineering profession pays more than a lip service to this pronouncement. Indeed, there probably is today no group of men more absurdly underpaid than the engineers of this country. At least a considerable percentage of these men are employed by engineers who take high rank in their profession and, indeed, who deserve this high rank. The reason for this condition is not hard to find. Engineers are constantly seeking ways of reducing cost. The method of securing this end which appeals most strongly to men generally is that of keeping salaries and wages down.

This is not the place to analyze the actual effect of such a procedure, but the fact remains that there are large numbers of men, among whom are found numerous engineers, whose ideas as to securing low unit costs of production do not extend further than a general and rather hazy impression that if salaries and wages are kept down, unit costs will thereby be reduced. It would naturally be expected that in dealing with such men one would find no real effort to make remuneration commensurate with "ability, initiative and constructive effort," and, indeed, there is no real effort to that end, as the salaries paid to engineers *by* engineers in this country amply demonstrate. Moreover, this statement will, I very strongly surmise, apply to the heads of organizations which assume to lead engineering thought and to issue pronouncements on engineering ethics just as completely as it does to engineers not so conspicuously in the public view.

It would seem, therefore, that the engineer must, not because he particularly desires so to do, but because he has no other recourse, develop an organization composed of men from the rank and file of the profession and that this organization must be manned by and operated in the interest of the rank and file of the profession. Such an organization may not have silk-hat manners. It may not conduct itself along established lines of professional ethics, but it will get what the engineer now most needs and what he went into his profession for—a reasonable salary.

Finally, let me submit for the consideration of engineers generally, that the coal miners would not be receiving their present wages if they had elected the president of the Lackawanna Coal Company as the president of the coal miners' union, nor would the railroad brotherhoods be receiving their present wages if their board of directors consisted of the presidents of the Northwestern, the Burlington, the Pennsylvania, the New York Central and the Union Pacific Railroads. These gentlemen are most estimable and extremely valuable members of society. Any one of them would make a more diplomatic leader than the brotherhoods have ever had, but would his diplomacy have increased the wages of the railroad firemen? The answer is too simple to require that it be stated.

Until engineers are able to get this point of view and are able to develop their own organization along their own lines and to operate this organization independent of the assistance of the aristocracy of the engineering professions, their salaries will continue to be as poor as they are now. Moreover, there will be no one but themselves to thank.

The engineering profession is in grave danger. Very few of the members of this profesion, speaking relatively, could today give their children the education which they have themselves received. Very few of them enjoy the social position which they held even five years ago. Indeed, many of them lack the ordinary comforts of life. The plumber, the bricklayer and the carpenter all receive larger compensation than even a pretty fair engineer. And, for all of this, the leaders of the profession are, to a large extent, responsible, because of their failure to act as real leaders. The claim, then, that a man cannot be an engineer and also a member of a union resolves itself into nothing more than this:

> Engineers are poorly paid because
> Engineers are poorly led
> but
> You can't be an engineer if you try to find better leadership and better pay!! That would be improper, undignified and contrary to established professional ethics!!!

And, the real question is, Will engineers continue to subscribe to this doctrine?

J. L. HARRISON,
Washington, D. C. Bureau of Public Roads.

Uniform Practice in Farm Surveys

Sir—It has been my duty to look over many surveys of farm lands from the standpoint of the owner, and I find considerable lack of uniformity in describing the courses. Many engineers begin their description at some obscure corner of the property and run it around counter clockwise.

I believe if there were uniformity of practice in starting a farm survey from the principal corner of the farm—which would naturally be the corner on the main highway—and in running around in a clockwise direction, it would be to the benefit of surveyors and a great convenience to those who have to do with land titles.

R. T. CHILDS.
New York, N. Y.

Paint Service and Paint Technology

Sir—Several paragraphs of your summary (issue of Oct. 30-Nov. 6, 1919, p. 827), of the report of the American Railway Bridge and Building Association on railway bridge painting practice attracted the writer's attention, as they bring out again the rather remarkable disregard, on the part of so many extensive paint users, of some very simple and basic principles in paint technology that would promote economy and efficiency if more generally observed.

It is noted that in "coast regions where the atmosphere is damp, warm and impregnated with salt . . . painting must be done every year." This is, most certainly, not necessarily true. It is true if it is attempted to use the same sort of paint in coast districts as inland, however successful they may have been there. There are both pigments and vehicles that show up very well inland which are destroyed by the salt in the sea atmosphere, but on the other hand there is no reason but habit for using these materials, and there are others much less susceptible. Lead pigments, for instance, are chemically effected and discolored by salt atmosphere, to a serious extent; zinc not so much; lithopone, asbestine, carbon and graphite (and iron oxide) not at all. In the vehicles, the linseed oil is the element attacked, but the addition of other ingredients decreases this action.

The reason for the failure of the bituminous paint on the bridge span is very simple. It is a fact that as a protective agent against almost any form of steel corrosion, there is no material superior to a bituminous

paint, but it has one fatal weakness which was overlooked in this case: It is destroyed by direct sunlight. Therefore, for interior painting, where black is permissible, it is most valuable, and much economy would result from a more general recognition of this fact, but for outside work it is absolutely inadmissible.

As to the painting of the galvanized iron, the zinc coating has absolutely nothing to do with the nonadherence of the paint. The latter effect is due to the film of palm oil which adheres to the sheet in the galvanizing process. The surface of the molten zinc is covered with palm oil to prevent oxidation, and, naturally, as the sheet of iron is withdrawn from the pot the oil clings to the surface of the sheet. This palm-oil skin can be removed with Sapolio and water and, after it is removed and the surface is dry, paint will adhere as well as to any other surface.

A. H. RHETT,
New York City. Engineer, Toch Brothers.

Triangular Bridges and Horace E. Horton

Sir—Referring to the "Inglis Light" footbridge, mentioned on page 692 of your issue of Oct. 9, 1919, and the originator of the triangular cross-section for bridges: I recall that about 35 years ago Horace E. Horton, a noted bridge designer in those days, designed and advocated the construction of long-span bridges having a triangular cross-section, formed by a single upper chord and two lower chords. The complicated details, for shops of that time, probably prevented the trial of this type for long spans, but in light moderate spans there is an example of triangular cross-section truss work in a train canopy at the Englewood union railroad station in Chicago, built by Mr. Horton, or the Chicago Bridge & Iron Co., many years ago and still in service.

J. W. PEARL.
Chicago, Ill.

Do Meters Prevent Water Famine?

Sir—The article in *Engineering News-Record* of Sept. 25, 1919, p. 611, entitled "Meters Prevented Water Famine at Pocatello," appears to be a reprehensible example of newspaper propaganda, especially objectionable in a journal of such standing. The title indicates the responsibility of the editor for a fixed policy of meter propaganda of many years standing, as frequently shown in other articles of the same trend. A careful reading of the item shows very clearly that the strict enforcement of the one-hour limit on sprinkling, necessary in spite of the meters, was the real preventive of the water famine at Pocatello.

Furthermore, a little arithmetic will show that the statement that consumption has been cut from 350 gal. per capita to 110, with a present population of 18,000, requires that the population three years ago was less than 6000, for the 2,000,000 gal. daily minimum flow—showing a remarkable growth, if true.

This policy of advocating universal metering may be defensible where good water is only obtainable at considerable expense for pumping, filtering and chemical treatment, but where a decrease in consumption effects no corresponding decrease in cost of water furnished, the condition is altered. Where water is naturally pure and the yearly flow is ample for many times the population, as is the case at Portland, Ore., the cost of full metering, with its annual charges for reading, billing and depreciation, intelligently applied to the purpose of boosting the low water flow during the two months of dry weather, would secure ample minimum supply for more years than the life of the meters. As it is, even with a fully metered city, Pocatello's example in restricting sprinkling will necessarily have to be followed and the flow supplemented by storage. Thus, in this case the meters (except for large consumers) are a total loss as an investment. The point is, as I pointed out in letters to *Engineering News*, published June 3 and July 8, 1915, that circumstances vary, and one metering plan is not best for every case. This is a reasonable proposition in almost any line, but one which the editor appears unwilling to admit as applicable to meters.

In Portland's case, the proposed universal metering is in fact only a costly expedient to remedy a total lack of foresight regarding water-supply, an example of what another article in the same issue points out under the heading, "Lack of Foresight in City Water-Supplies."

Portland, Ore. GEORGE RAE.

[Mr. Rae misses the point in that 1919 was the dryest year of record in Pocatello, and the 2,000,000-gal. minimum refers to 1919 conditions, although there has been a decided increase in population and in large water users. Doubtless there have also been seasons in the past when for brief periods the average of 350 gal. daily was not obtainable. Pocatello is 52% metered, not "fully" as Mr. Rae says. Had it been 100% metered sprinkling restrictions may or may not have been required, but in our opinion they would not have been.

Circumstances do vary, but by and large we believe in selling calico by the yard, sugar by the pound, gas by the cubic foot and water by the gallon, regardless of whether or not somebody lacks foresight in providing a superabundance so that future generations may continue to be wasters. The sooner the people of this country come to their senses in the way of paying for what they get and not for what someone else gets, the sooner shall we be on a sound economical and sociological basis. —EDITOR.]

Board of Consulting Engineers for Columbus

Acting upon a proposal made by the Engineers' Club of Columbus, Ohio, the council of that city passed an ordinance this year providing for the creation of a board of consulting engineers. The duties of the board are "to give to the mayor and the city council expert advice and information on any matter that may be referred to such board for consideration, and, in its discretion, to make recommendations to the mayor and city council on any subject connected with the administrative work of the city Government." The board consists of five members, two of whom are the director and the chief engineer of the public service department. Five other members are appointed by the mayor. The ordinance requires that these members be either architects or civil, mechanical, or electrical engineers of recognized standing and five years' active experience in their profession. The members of the board serve without compensation. The five appointive members now serving, all of whom are members of the Engineers' Club of Columbus, are: C. E. Sherman, professor of cival engineering, Ohio State University; E. G. Bradbury, sanitary engineer; N. D. Levin, mechanical engineer; J. J. Morgan, structural engineer, and F. W. Jennings, civil and highway engineer.

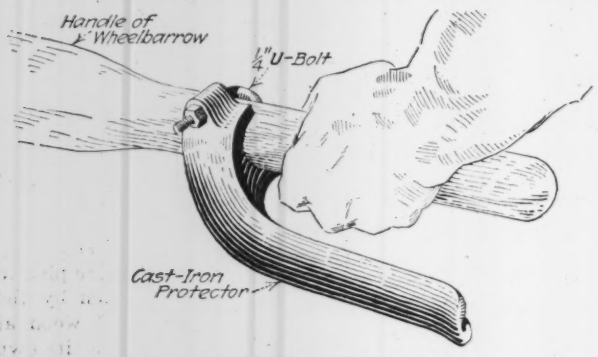
HINTS FOR THE CONTRACTOR

DETAILS WHICH SAVE TIME AND LABOR ON CONSTRUCTION WORK

Knuckle Guard for Wheelbarrow Handles

By JOHN H. SAWKINS
Schenectady, N. Y.

FIRST aid to "skinned" knuckles, which are a considerable cause of time lost where many men are operating wheelbarrows, is practically eliminated by the simple knuckle guard illustrated by the accompanying sketch. The guard can be attached to and removed

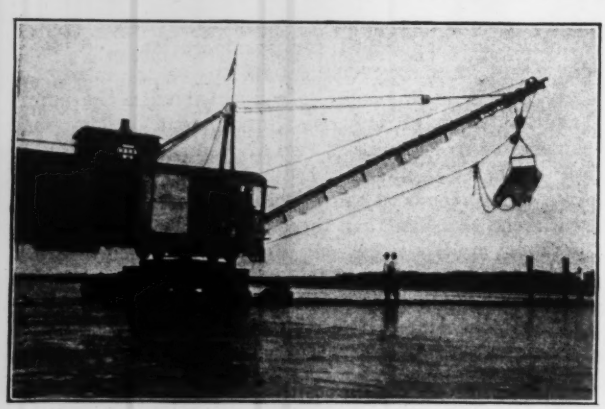


GUARD PROTECTS WHEELBARROW USER'S HAND

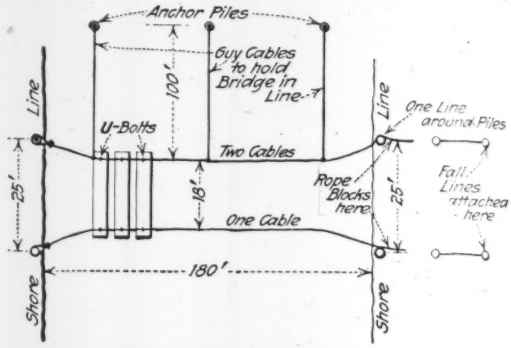
quickly from the handle, and when men are working in close quarters and about staging it will prevent many a bruised hand.

Dragline Crosses Rio Grande on Cable Pontoon Bridge

PARALLEL steel cables which were attached to shore piling and on which floor timbers were threaded formed a floating suspension bridge on which a 70-ton dragline excavator successfully crossed the Rio Grande, in conducting work on the Rio Grande project of the United States Reclamation Service. The river at the point of crossing is about 800 ft. wide and consists of two channels with a shoal between. The channel on the west side carried most of the water, which varied in depth from 18 in. at the edges to 40 in. at the center. It was across this deeper channel that the suspension pontoon bridge was constructed as shown by the diagram, the piles being driven as indicated. Two ¾-in. cables were stretched, fastened and made taut by a set of double blocks fastened to the piles, the cables being given one turn around the shore pile at the right.



DRAGLINE EXCAVATOR CROSSING PONTOON SUSPENSION BRIDGE



SKETCH PLAN OF SUSPENSION PONTOON CROSSING FOR DRAGLINE

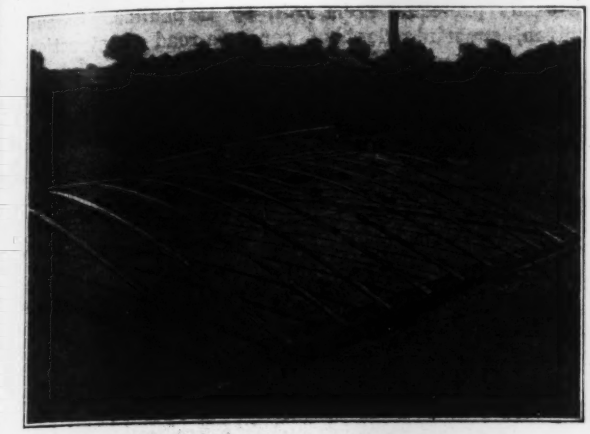
Downstream 25 ft., corresponding piles were driven and spanned between by a single cable fastened and tightened as were the upstream cables. Across these "parallel" cables was laid a floor of 6 x 16 in. x 20 ft. timbers spaced 6 in. apart. The timbers were fastened to the cables by ⅝-in. U-bolts. About 67 timbers were required.

The dragline machine, mounted on caterpillars, propelled itself across this bridge without trouble. Beyond the bridge in shallow water it moved on self-laid track after the manner described in *Engineering News-Record* of Sept. 18, 1919, p. 582. The crossing operation from shore to shore required 6½ hours and the cost, including materials and haulage, was $355. N. E. Fordham, master mechanic of the Rio Grande project, devised the method of making the crossing and directed all operations.

Light Arch Supports for Canvas Sun Shields

CANVAS sun shields cost 75% less to shift, on concrete-road work near Smithfield, Penn., when the canvas was supported as illustrated, than when it was spread over the concrete without support. It required 1500 ft. b.m. of lumber, nails and wire costing $3, and the labor of four men for two days, or a total expenditure of $102, to construct eight 25-ft. sections of frame. The method of construction was to set up a horse along the middle of a completed slab and lay across it the boards long enough to bend down and touch the side forms. Then the longitudinal center and side strips were nailed to the ribs, and the ribs bent down and held to curve by placing wire ties fastened to cleats.

A crowbar pulled the ties taut. When the canvas was spread on the concrete it took eight men and a foreman



EASILY SHIFTED SUN SHIELD FOR CONCRETE ROAD

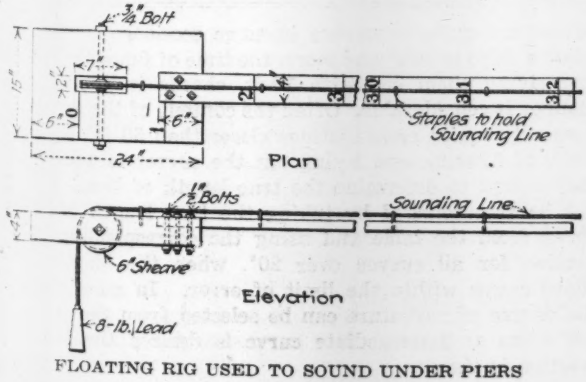
one hour to shift 200 ft. of covering. With the frames, the same crew makes the shift in 15 min., at a cost of about ½c. per square yard of slab covered. Reagan & Lynch, Uniontown, Penn., the contractors for the road, devised this sun shield, which is described in the *Concrete Highway Magazine* for November, 1919.

Rig Used for Sounding Under Piers

BY R. W. BEUTTENMULLER
Great Lakes Dredge and Dock Company

ON A war construction operation at the Philadelphia Quartermaster Terminal it was necessary to carry on piledriving and dredging at the same time, in order to keep up with the progress outlined. This did not give the necessary time to permit of dredging the slopes in the slips before piledriving and concrete work began. In order to remove the pressure from the piles, due to the material retained by them, it was necessary to jet the material from under the piers. By the time the jetting had been done, the piers had been decked, and the concrete retaining wall was in place and backfilled, which eliminated the ordinary methods of sounding under the piers. The writer devised a rig as shown in the sketch.

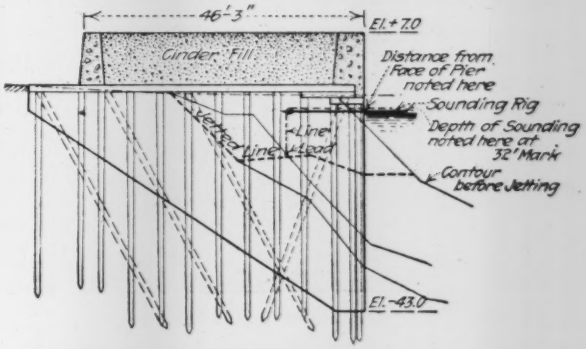
The method used was as follows: First the rig was floated and the flotation line noted; then the lead was pulled up until it struck the bottom of the 4-in. plank, and the distance from the flotation line to the bottom of the lead was then measured. The 32-ft. mark was assumed as the zero for the sounding line but, due to the construction, it was necessary to move the zero of the sounding line toward the 31-ft. mark the distance above



FLOATING RIG USED TO SOUND UNDER PIERS

noted—that is, the distance from the flotation line to the bottom of the lead when pulled up tight. The sounding line was marked off in foot intervals from the zero tag located as told above.

The sounding board was then pushed underneath the



TYPICAL DREDGING SECTION AND TYPE OF PIER

piers at 5-ft. intervals, and the sounding taken at each point; at the same time the distance in from the face of the pier was noted as shown by the figures on the sounding board, and the depth of sounding as shown by the tag on the sounding line. These points were plotted and connected up with the cross-section taken by the ordinary methods, in the slip. The block of wood at the end of the rig must be large enough to float its own weight plus the weight of the lead. A typical cross-section, with the rig in place, is shown.

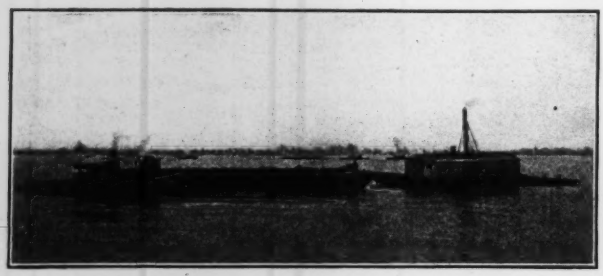
Dredge Scows To Be Emptied Let Down Niagara River on Lines

DREDGED excavation from the bed of the Welland River, which forms the first stretch of the new Queenston-Chippawa power canal around Niagara Falls being built by the Ontario Hydro-electric Power Commission, is being dumped from scows in the Niagara River about a mile or a mile and a half above the brink of the Canadian falls. As the current is very swift here, and the danger of a scow getting away is great, the scows are let down the river from a fixed crib in the Niagara River just off the mouth of the Welland River. The views herewith show the progress of the dumping operation.

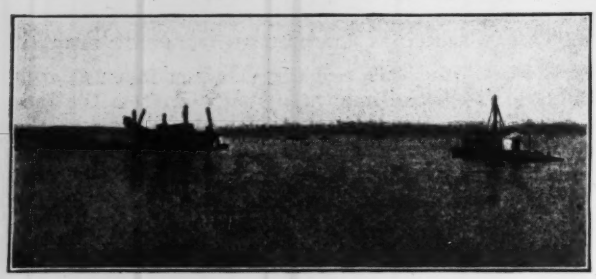
At the time when these pictures were taken the dredge was working just at the mouth of the Welland River to the left of the view. It is now well up the river and the scows are loaded by the dredge and are taken by tugs to the crib, which shows at the extreme right of all the views. This consists of a pile crib, and attached to it is a scow carrying hauling machinery; that is, an ordinary hoisting engine with about 2500 ft. of line.

The scows are brought by the tugs to the crib and attached there to the hoisting line. They are then let down the river with an attending tug, or, as is shown in the view, sometimes two, which, for the first thousand feet, act merely as guides. After that length of line is paid out, it commences to drag on the bottom and the tug has to exert some slight pull on the filled scow. At the end of the 2500 ft. of line the scow is dumped, and is then hauled back by the line to the fixed hoist, where the tug picks it up and takes it back up the river to the dredge.

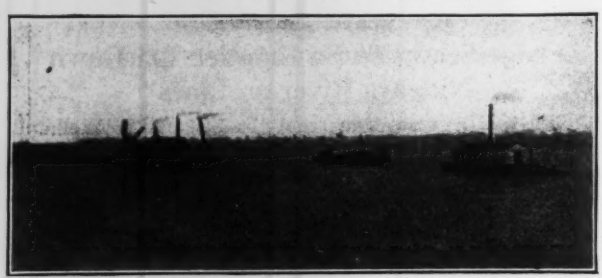
About a year ago a scow on the other side of the river, with five men aboard, got loose and washed down to the brink of the Canadian falls. Three of the men jumped overboard and were lost. Two of them, however, remained aboard and when the scow caught on a projecting rock almost at the brink of the falls were



Scow being fastened by line to hauling crib



Letting scow down river from hauling crib



Hauling emptied scow back to crib

DUMPING SCOWS IN NIAGARA RIVER

rescued by a lifeline shot out from the adjoining Ontario power development power house. This accident, however, led the engineers of the Ontario Hydro-electric Power Commission to consider some safe method of controlling the unloaded scows.

Flat-Car Cement Stock Pile for Paving Mixer

SACKED cement delivered by motor trucks, on road work in Mason County, West Virginia, is unloaded onto a platform on wheels, traveling with the mixer, instead of onto the ground, and considerable labor is thereby saved in handling cement. The platform is 4 x 8 ft., of 2-in. oak planks, and is mounted on four mine-car wheels on $1\frac{5}{16}$-in. axles, with roller bearings. A track way of 10-ft. lengths of 3-in. joists, armored with $\frac{1}{4}$-in. steel straps, carries the platform car. It is proposed to substitute track sections of light steel rails. The platform holds 80 sacks of cement. With this traveling platform the cement can be lifted directly to the charging skip; it does not touch the ground, and can be easily protected from rain by tarpaulins. Samuel Lutton, superintendent of concrete-road construction,

CEMENT STOCK PILE ON FLAT-CAR

Mason County, devised this arrangement, which is described by L. E. Musgrave in the *Concrete Highway Magazine*, for November, 1919.

Convenient Table for Locating Short-Radius Curves

BY C. M. PRITCHETT
Resident Engineer, North Carolina State Highway Commission

TIME is saved in laying out sharp curves by using the accompanying table employed by the writer for mountain road location in North Carolina. On this work a minimum radius of 50 ft. is allowed, and as these curves are quite numerous in some sections, involving often a *delta* of 180° and more, the time of figuring them and laying them out with 10-ft. chords in the usual manner is considerable. Often the contour of the ground does not require cross-sections closer than 50 ft., so the work of figuring and laying out the curves is unnecessary except to determine the true length of line. This can be accomplished by taking the true length of the chord from the table and using the corresponding deflection for all curves over 20°, when the length of chord comes within the limit of error. In most cases the degree of curvature can be selected from the table, but when an intermediate curve is desired the interpolation is simple.

SHORT-RADIUS CURVES TABLE

Radius	D	Def. for 50-Ft. Arc	Def. per Ft. of Arc	Chord for 50-Ft. Arc	Chord per Ft. of Arc
50.0	114°—36′	28°—39′	34.38	47.9	0.959
52.1—	110°	27°—30′	33.0	48.1	0.963
54.6—	105°	26°—15′	31.5	48.3	0.966
57.3	100°	25°—0′	30.0	48.4	0.969
60.3+	95°	23°—45′	98.5	48.6	0.972
63.7—	90°	22°—30′	27.0	48.8	0.975
67.4+	85°	21°—15′	25.5	48.9	0.978
71.6+	80°	20°—0′	24.0	49.0	0.980
76.4	75°	18°—45′	22.5	49.1	0.982
81.9—	70°	17°—30′	21.0	49.3	0.984
88.1+	65°	16°—15′	19.5	49.3	0.986
95.5	60°	15°—0′	18.0	49.4	0.989
104.2—	55°	13°—45′	16.5	49.5	0.991
114.6	50°	12°—30′	15.0	49.6	0.992
127.3+	45°	11°—15′	13.5	49.7	0.993
143.2+	40°	10°—0′	12.0	49.7	0.995
163.7+	35°	8°—45′	10.5	49.8	0.996
191.0	30°	7°—30′	9.0	49.9	0.997
229.2	25°	6°—15′	7.5	49.9	0.998
286.5	20°	5°—0′	6.0	50.0	0.999

NEWS OF THE WEEK

New York, December 25, 1919

Cummins Rail Bill Passed by Senate

Nonpartisan Vote of 46 to 30—Measure Will Go to Conference with the Esch Bill

The Cummins railroad bill was passed in the Senate Dec. 20 by a nonpartisan vote of 46 to 30, just before adjournment for the holiday recess. Immediately after the first of the year it will go to conference, together with the Esch bill. It is believed that neither bill will ultimately be adopted, but rather a compromise measure, which will not, however, embody new features, as this is prevented by the rules. An outline of the bill was published in *Engineering News-Record* of Sept. 4, 1919, p. 485. The Esch bill was described by Representative E. E. Denison of Illinois in a specially prepared article in *Engineering News-Record* of Nov. 13-20, 1919.

The Cummins bill differs from the House measure principally in providing for a Federal Transportation Board and a definite plan for fixing rates to produce fixed percentage return on value of properties. The bill also provides for consolidating the railroads of the country into from 20 to 35 competing systems. For the first seven years the consolidations would be voluntary, and thereafter would be compulsory. The bill also embodies drastic anti-strike provisions which are not contained in the House measure.

It is expected that the President will present his railroad message to Congress soon after the holiday recess and before the Senate and House conferees have reported a final measure.

Just before the passage of the Cummins bill the Senate rejected, by a vote of 65 to 11, the La Follette measure for extending Federal control two years.

Urge Examination for Chicago City Engineer

Engineers of the Chicago Chapter of the American Association of Engineers are requested in the *Monthly Bulletin* to write letters to their aldermen and the Civil Service Commissioner requesting that an examination be held for the position of city engineer of Chicago. The reason given is that a civil-service vacancy exists, and that there should be no question of the capabilities of the incumbent. Furthermore, a letter, which it is suggested be used, requests that an examining board of consulting engineers be appointed to prepare an examination, their names to be published prior to the examination and the appointee to be selected from the three applicants obtaining the highest rating.

To Abolish United States Housing Corporation

On Dec. 17 the House of Representatives passed without a dissenting vote a bill ordering the sale of the housing facilities erected by the Government during the war and abolishing the United States Housing Corporation. The bill transfers the property to the United States Treasury for sale to private persons, either for cash or part payment. It now goes to the Senate.

Would Enlarge Roads Bureau

Enlargement of the Bureau of Public Roads is asked in a resolution adopted unanimously at the convention of the Mississippi Valley Association held recently in Washington. The resolution also asked that the present Federal aid system be undisturbed.

Engineers on the Pan-American Trade Conference Committee

Several engineers are included in the membership of the committee of the second Pan-American financial conference, which will be held in Washington, D. C., Jan. 12-17, 1920. The following engineers are noted on the committee: Col. F. A. Molitor, consulting engineer, New York City; Calvin W. Rice, secretary, Am. Soc. M. E.; Verne Leroy Havens, editor, *Ingenieria Internacional*, McGraw-Hill Co., Inc.; S. T. Henry, vice-president, Allied Machinery Corporation; W. L. Saunders, chairman of the board of directors, Ingersoll-Rand Co., New York City; Pope Yeatman, consulting mining engineer, New York City; Philip W. Henry, vice-president, American International Corporation; J. G. White, of the J. G. White Corporation; Lindon W. Bates, contracting and consulting engineer, New York City.

Cincinnati Contractors Join National Body

Following a recent visit to Cincinnati by F. O. Southbrook, field secretary of the Associated General Contractors of America, the Cincinnati Contractors' Association of Public Works has affiliated with the former body. Announcement of the decision of the Cincinnati organization was made at the regular monthly meeting Dec. 4. The decision was unanimous.

Levee and Drainage Contractors To Meet in St. Louis

The Levee and Drainage Contractors' Association of America will hold its third annual meeting in St. Louis, Dec. 30, with headquarters at the Planters Hotel.

Campaign Begun To Support Development Report

Philadelphia Members, Am. Soc. C. E., Start Drive to Secure Backing for Project to Secure a United Profession

With the object of securing a favorable vote on the fundamental recommendations of the Committee on Development of the American Society of Civil Engineers and of securing a large attendance at the annual meeting in New York City, Jan. 21, 1920, the executive committee of the Philadelphia Association of Members, headed by Richard L. Humphrey, has begun an intensive educational campaign among the society's membership resident in the fourth district. Teams captained by engineers well known locally are now making a canvass of the members in Philadelphia, Altoona, Wilkes-Barre, Harrisburg, Allentown, Camden, Trenton and throughout the States of Maryland and Delaware. The objects of the campaign have been explained in detail in a report just issued by the executive committee, which includes, in addition to Mr. Humphrey, H. T. Shelley, Benjamin Franklin, Jonathan Jones, F. Herbert Snow, S. M. Swaab and Samuel T. Wagner. The recommendations contained in the report, it is explained, have been made with a view to making the united engineers of this country a recognized power and stimulating technical activities. The principal portions of the report follow:

The report of the Committee on Development covers two distinct fields:

1. External relations,
   (a) in technical matters with other societies and
   (b) in nontechnical matters or welfare work for the improvement of the status of the engineer in his relation to the public and to other engineers.
2. Internal relations,
   (a) increased technical activities and changes in present methods, involving only society matters.

While the formation of the single comprehensive organization recommended provides for affiliation in welfare work, it does not contemplate the amalgamation of the society with other national and local engineering societies nor does it contemplate any interference with the present technical and professional activities of the society.

The fundamental recommendations are:

1. External relations,
   (a) That the American Society of Civil Engineers "adopt the principle of becoming an active na-

tional force in economic, industrial and civic affairs, and with that purpose in view become an active factor in coöperation with other engineering and allied technical associations of the country." (Division C*).†

(b) "That a comprehensive organization be created as outlined in the Joint Conference Report" (Division C).†

2. Internal relations,

(a) that the technical activities of the society be increased (Division A, Sect. 1-5).†

(b) That local sections be created to embrace the entire membership of the society (Division B, Sect. 1, Par. a, b, c, d and h).‡

(c) That the director in each geographical district be nominated and elected by vote of the corporate members resident therein (Division B, Sect. 1, Par. e, f, g and l).‡

(d) That a portion of the society dues be allotted to local sections (Division B, Sect. 2, Par. i).†

(e) "That there be held during the annual convention a conference of the representatives from local sections to consider the welfare of the society and its members and report thereon to the Board of Direction" (Division B, Sect. 1, Par. j).†

(*f*) "That the present nominating committee be abolished and that a candidate for each of the offices of president, two vice-presidents and treasurer be nominated by the annual conference of representatives of the local sections" (Division B, Sect. 1, Par. k).‡

(g) That the present grades and requirements for membership be revised (Division B, Sect. 2).‡

(h) "That the dues of all members above the grade of Junior be adjusted to provide for the greater activities of the society and to the extent that the recommendations" of the Committee on Development "are adopted" (Division B, Sect. 3).‡

The above are the vital points in these recommendations. The details are relatively unimportant and must be worked out by properly constituted authority and will change from time to time as the necessity arises. Why not give this plan for a united engineering profession a trial and trust the wisdom of those charged with carrying it out to care properly for the details? The engineer has passed beyond the narrow limitations of yesterday and must take his place in the world's affairs. This is not a time for prolonged debate, but for action.

Do you know that there is a general tendency among states to enact laws for licensing the engineer?

Do you know that steps are being taken by the British Institution of Civil Engineers to obtain from Parliament statutory powers to regulate and establish registration for the civil engineering profession?

Do you know that a draftsman in order to obtain employment in some shipyards in Seattle, Wash., must be a member of a local of the American Federation of Labor?

Do you know that architects are being employed to design and build bridges in this state?

Do you know that an organization of draftsmen in Portland, Oregon, is seeking affiliation with labor in order to force the use of a union label on engineering plans?

Do you know that the Chairman of the National Service Committee of Engineering Council states that in his efforts to secure support for a national Department of Public Works "a great man—an acknowledged statesman, a high-minded politician, and a keen observer of people and events"—said:

"Your task is appalling. You have been elected to lead engineers into a political reform. They are the most unresponsive citizens that we have. Your organization has a praiseworthy purpose, but if it were sponsored by almost any other group of reputable men than engineers there would be more promise of success. If your organization succeeds I believe you will find that it will not be the engineers who have carried it through. Their aloofness and indifference to all matters outside of their own professional sphere are among the unexplained things in our political life?"

In view of the above facts, do you not think that the engineer should do something, to secure united action by the engineering and allied technical associations on matters of common interest to them?

Believing that you must be in favor of improving the status of the engineer, this committee is asking you to take an active part in making effective the basic recommendations of the Committee on Development.

Remember, this affects you. The gravity of the situation demands that each engineer shall do his duty. Go to the annual meeting of the society. Vote to place the engineering profession where it belongs.

*Report of the Committee on Development to the Board of Direction of the American Society of Civil Engineers.

†Requires no amendment to the constitution.

‡Requires an amendment to the constitution.

Apportionment of Highway Costs in Maryland

Reapportionment of division of road funds between Baltimore and the counties of Maryland will be made an issue in the highway-construction plans to be brought before the Maryland legislature at its session in January next. The burden of raising more than 75 per cent of the highway funds rests upon Baltimore, through its larger taxable basis, and a more just share of the funds than the 20% the city now receives will be asked. It is probable a 50% apportionment will be sought.

Public Officers Talk Road Finance

State, city, and county officials, and representatives of prominent state and municipal civic organizations of New York, met in Albany Dec. 17, to consider a twofold question: Was the present road construction scheme as being prosecuted in New York to be continued, and, if so, what financial means would be supplied to carry on that program? The meeting was called at the request of Governor Smith, and efforts were made to have at the meeting representatives from every board of county commissioners in the state, as well as numerous state and city officials and representatives of automobile and civic organizations. The discussions were extemporaneous, and inasmuch as the meeting was unofficial, no action was taken by the two hundred-odd interested men present. It was the general opinion of the meeting that no let-up should be given the general road-building program adopted by the state, but when there came further discussion as to how New York should finance its road construction after the remaining $10,000,000 of the second $50,000,000 bond issue are expended, three possibilities for raising needed revenues were considered—long-term bonds, serial bonds, and the "pay-as-you-go" plan. General dissatisfaction was expressed with the method of authorizing the issuance of long-term bonds, it being pointed out that the two $50,000,000 issues now practically expended would, when all bonds are retired, have cost the state approximately $300,000,000.

The greater part of the three-hour session was devoted to a discussion of the relative merits of the pay-as-you-go plan and short-term serial bonds. A report from Commissioner of Highways Greene indicated that the last of the $10,000,000 would be consumed during the 1920 construction season, and, figuring upon $40,000 a mile as a safe figure for future construction, a bond issue of $100,000,000 had been suggested. Figures compiled by the State Comptroller indicated that the average yearly cost of carrying the bond issue, including the average annual interest and the average annual sinking fund, would be $6,351,926. This would amount on a 30-year issue to $190,557,780. Under a pay-as-you-go plan, Mr. Greene showed, were the state and county each to provide 25% of the money needed to match Federal aid, and were they each to appropriate in addition $4,500,000 from a general fund, there would be available for road construction in New York State more than $18,000,000. During 1919, he said, 174 contracts, aggregating $18,107,000, had been let, and that it was impracticable to spend more, both because of the inability to secure men and materials and also because state highway departments in general did not seem to have hit upon the way of properly attracting big contractors with adequate plants to carry on large pieces of construction. Under this pay-as-you-go plan, therefore, the state's total share of this approximate

$18,000,000 would be $6,864,000, to be raised by direct tax. As there are, according to the present schedule, 882 miles of state roads and 2424 of state-aid roads, this total mileage could be built, said Commissioner Greene, under the pay-as-you-go plan in from 8 to 10 years, at the most.

Considerable objection was raised to the "pay-as-you-go" plan because of the possibilities present of any state legislature cutting road appropriations when the budgets were made up. Although a few men were present with authority to state that the organizations they represented favored the $100,000,000 bond issue, the general opinion expressed was to the effect that the question should receive the fullest and most serious discussion by financiers and legislators of the state, and that a plan, perhaps proposing the issuance of short-term serial bonds, be presented to the next legislative assembly.

Although the discussion of types of roads was not scheduled and, as a matter of fact, speakers were asked to confine their remarks to discussions of the twofold question above mentioned, former Commissioner of Highways Carlisle asserted that he could not consider any financial program without taking into account the type of pavement. To his mind, "$40,000-a-mile highways" were "preposterous." He urged against the adoption of any scheme admitting wholesale construction of such types, regardless of location, and asserted that construction of concrete roads on such a scale meant that New York State must to a great extent lose what macadam and bituminous roads it had already laid.

Valuation Features of Commission Report to Congress

In its annual report to Congress, presented this month, the Interstate Commerce Commission states that 53 tentative valuations have been served to date, although there has not been "fixed a single sum as the final value" of the Texas Midland R.R., the Kansas City Southern System, and the Winston-Salem Co., since legal actions upon protest have been taken.

The field work of the engineering section has been substantially finished, road and track parties having been disbanded in the Southern, Western and Pacific districts, with the expectation of disbanding those in the Central district about the first of the year. It is stated that progress in the land section has not been so great, due to the inability of the carriers to supply the necessary pre-inventory information.

The greatest difficulty is being experienced in the accounting section, as men capable of compiling statistics in narrative form are hard to find.

Arguments will be heard, early in January, of parties desiring the fixing of actual values in tentative valuations, in which no definite values have as yet been assigned, to aid in a study of the question.

Col. Henry W. Hodge Dead

Had Been New York Public Service Commissioner and Served For Over Two Years with the Engineers in France

Henry W. Hodge, consulting engineer, former colonel, Engineers, U. S. A., and former public service commissioner for the First District, New York State, died suddenly at his home, New York City, Dec. 21.

Prior to his work as an Engineer officer with the A. E. F. in France, Colonel Hodge, as a member of the firm

COL. HENRY W. HODGE

of Boller & Hodge (later Boller, Hodge & Baird) aided in the design and construction of some of the largest buildings and bridges in the country, many of them in New York City. His firm was engineer for numerous foreign enterprises, having designed over 1700 bridges for Mexico, all of the bridges for the Bolivian Central Railway, for the Madeira-Mamore and for the Cerro de Pasco.

The appointment of Colonel Hodge to the Public Service Commission in January, 1916 (the commission having charge of all subway construction work in the city), came after a great deal of public pressure had been applied demanding the appointment of an engineer to fill a vacancy created by the resignation of Robert C. Wood. Colonel Hodge continued as a commissioner until his resignation in June, 1917, when he entered the military service as a major of Engineers. His appointment as a member of the Public Service Commission received universal indorsement from the engineering profession, as his was the first appointment of an engineer to a New York State commission having control of so large a program of construction as that of building the New York subway system. He was accorded by his engineer friends a complimentary dinner after his appointment had been announced, and during his incumbency he proved a fearless public official. His independence frequently impressed the other commissioners. At hearings of property holders, when man after man would appear and repeat the same thing Colonel Hodge would suggest the immediate adjournment of the hearing, against the ardent protest of the citizens present. He believed in saving time for the commission, and fought for that end. Moreover, the petty play of politics had no consideration at his hands. When property holders pleaded the need for better transportation in their district, disregarding entirely whether the company was financially able to furnish it, Colonel Hodge would come back to the economics of the situation and inquire into the justice of the case from the utilities standpoint.

After his resignation from the commission and his commission as a reserve officer, he went to France with the American Expeditionary Forces. He was first manager of roads under the Director General of Transportation and held the same title under the Director of Light Railways and Roads. He was then transferred to G. H. Q., where he became the chief of the bridge section of the Office of the Chief Engineer at General Headquarters.

Boller, Hodge & Baird, of which firm Mr. Hodge had been senior member since the death of Mr. Boller in 1912, designed many of the largest bridges and buildings in the country, among them being the Duluth and Superior bridge, the cantilevers across the Monongahela and Ohio rivers at Pittsburgh and Steubenville, Ohio, for the Wabash Railroad, the Singer and the Metropolitan towers in New York City, the municipal bridge across the Mississippi River for the City of St. Louis, the bridges across the Connecticut River at Hartford, Saybrook and East Haddam, for the State of Connecticut. Other engineering structures designed by Colonel Hodge's firm are the Central Bridge, the Melrose Avenue viaduct, and the Riverside Drive viaduct at 96th St., all in New York City.

Colonel Hodge was born in Washington, D. C., Apr. 14, 1865. After studying several years in a private school he joined the field forces of the Chesapeake & Ohio R.R. in West Virginia. In 1882 he entered Rensselaer Polytechnic Institute, from which he was graduated in 1885. He then became one of the assistant engineers of the Phoenix Bridge Co., of Phoenixville, Penn., where he remained until 1891, when he became chief engineer of the Union Iron Works, New York City, engaged in steel-building construction. In 1893 he resigned from that office to enter private practice, becoming, in 1895, assistant to Alfred P. Boller, in charge of bridge design and construction, and a partner in the firm of Boller & Hodge in 1899.

His most recent engineering work, before he entered the military service,

was as consultant to the New York and New Jersey Interstate Bridge and Tunnel Commission, and as consultant with the Canadian Government as consulting engineer on the new design for the Quebec bridge.

Colonel Hodge was a member of the council of the American institute of Consulting Engineers, a former director of the American Society of Civil Engineers, a member of the Institute of Civil Engineers of Great Britain, the Engineering Institute of Canada and the Railroad Club.

Court Decides Chicago Creosote Oil Specifications "Closed"

By decision of the Appellate Court of the first district of Illinois Dec. 2 the City of Chicago is enjoined from proceeding with paving where creosoted wood blocks are specified that are treated by a creosote oil which infringes the Reilly patent (1,220,001, held by the Republic Creosoting Co.). This decision reverses a decree of the Circuit Court of Cook County, Illinois, and directs that court to issue the injunction prayed for.

The Circuit Court entered a decree Feb. 27, 1918, dismissing for want of equity a bill brought by property owners to restrain the performance of a contract for paving Sherman St. from West Jackson St. to West Van Buren Street.

On the question whether the specifications tend to foster a monopoly in the manufacture of creosote oil and creosoted wooden paving blocks the court reached the conclusion that they do so tend. Section 74 of the local improvement act of 1897 prohibiting the use of patented articles is the one on which the second question hangs. The first is as to infringement of patent the validity of which was not questioned.

Bids Asked on Entire County Road System

According to an item recently appearing in the *Southwest Contractor*, bids have been called for by the Highway Commission of Arizona for the construction of 278 miles of paved highways in Maricopa County, the entire authorized road program under a $4,000,000 bond issue. Bids are to be opened Jan. 12, 1920. Specifications call for roads of cement concrete, asphaltic concrete, and crushed rock with asphaltic concrete. The materials necessary for the construction of this mileage include 600,000 bbl. of cement, 200,000 cu.yd. of sand, and 400,000 cu.yd. of crushed rock. The problem of supplying the materials has given the highway commission much concern. A supreme court ruling prevents the commission from carrying out a plan to have the county supervisor establish a rock-crushing plant and operate a cement mill and furnish materials to the commission at cost, which, the commission claimed, would have saved many thousands of dollars.

Industrial Conference Completes Preliminary Report

The National Industrial Conference, appointed recently by the President to formulate methods and machinery for handling and preventing labor difficulties, has completed a preliminary report which will be made public within 10 days. The conference adjourned Dec. 19 and will reconvene in Washington Jan. 12.

The preliminary statement will not be in the nature of a report to the President, Dr. F. W. Taussig, one of the conferees explained, but will be given out in order to indicate tentatively what the members of the conference think of proposing, so that they may be benefited by the criticism of interested parties.

"This statement will not say much about general principles," said Dr. Taussig, "but it will be chiefly given to the presentation of a constructive plan of mediation, conciliation and adjustment. Discussion and criticism will be particularly invited from labor and employer organizations.

"We have not considered any specific labor problems. We are merely trying to lay down methods of dealing with labor problems."

It is expected that upon the reconvening of the conference in January, hearings will be held, at which time representatives of labor and employers will be heard. These hearings will partly be in executive session and partly open to the public.

Union Depot at Los Angeles Built for Long-Haul Buses

The rapid increase in the number of passenger stages radiating from Los Angeles, Calif., has required the city council to pass an ordinance requiring all stages to load and unload their passengers under cover. To comply with this ordinance, several passenger depots have been built by the various stage companies, the largest being the union bus depot at the southeast corner of Fifth and Los Angeles Streets.

This depot is controlled by the Eldorado Stage Line, Pickwick Northern Division, Pickwick Inc., United States, White Bus Co., Mount Wilson Stage Co., and Murietta Stage Line. Approximately 200 stages are operating out of this depot daily, making an average of 500 trips each day. The average number of passengers carried is approximately 5000. Stage lines radiating from this depot touch all of the important cities in California, from San Francisco to San Diego and the Imperial Valley.

This depot is up to date in every respect, and compares favorably with modern railway terminals. The building is equipped with adequate rest rooms with maids in attendance, ladies' parlor, restaurant, barber shop, depot master, cigar stand, Western Union branch office, drug store, checking room, news-stand, information bureau, waiting room, drivers' club room equipped with lockers, ticket office and offices for the use of the company.

The depot is a one-story building with a mezzanine floor. The interior is finished in light gray with tile floors. All stages enter from Maple Ave. and discharge their passengers under cover. After unloading, cars proceed to a loading platform, where runways are provided for loading the various stages. It is estimated that 30 stages can be loaded at one time.

The union bus depot was put in operation in the latter part of September, 1919. This depot is owned by a holding company which is made up of the various stage companies. The stage companies are very careful in the selection of drivers. Drivers are allowed three days to break in, and then are subjected to a rigid examination. This method has reduced the number of accidents to a minimum.

New Staff Planning Sacramento Water-Treatment Works

A complete engineering staff has just been organized and detailed designs are being made for the $1,800,000 water-purification works at Sacramento, Calif., voted last June. The initial construction will be for 30,000,000 gal. daily taken from the Sacramento River just below the mouth of the American River.

There will be an intake tower, a low-lift pumping station, a grit basin, a coagulation basin and rapid sand filters and high-lift pumps operating under a head of about 200 ft., or about double the pressure now on the city mains. Special attention is being given to the preparatory treatment of the water because of its wide seasonal variation—from 0 to about 1000 p.p.m. of turbidity.

Comparative studies are being made to determine whether steam or electric drive would be the more economical in the two pumping plants. It is probable that filter alum will be made at the plant.

A tract of 48.6 acres is to be acquired by the city for the filtration and pumping plants. This will afford space for doubling the present capacity should such increase later become desirable. This tract is about 400 ft. back from the bank of the Sacramento River and will have an independent dike system for flood protection. Laying about two miles of 36- to 42-in. steel force main is included in the present program. It is not expected that actual construction work on the project will begin before August, 1920. The bonds bearing interest at 4½% have not yet been sold.

The engineering staff is as follows: Charles Gilman Hyde, professor of sanitary engineering, University of California, recently returned from service in the Sanitary Corps, is consulting engineer; C. G. Gillespie, formerly with G. W. Fuller of New York and more recently chief engineer, California State Board of Health, is resident engineer. There are three principal assistants: H.

B. Foster, formerly chief engineer of the Board of Regents, University of California, will have charge of hydraulic and filtration design and construction; George J. Calder, of Hudnut & Calder, structural engineers, Sacramento, will have charge of structural design and construction; B. F. Raber, professor of mechanical engineering, University of California, has been granted a leave of absence of one year to serve as principal assistant engineer in charge of mechanical and electrical design. H. N. Jenks is special engineering assistant, and Carl L. Knight is field engineer. S. N. Whitman, formerly in charge of utilities at Camp Meade, is office engineer. W. F. Langelier, formerly assistant professor of sanitary engineering at the University of California, will have charge of the chemical and bacterial work.

Unanimously Indorse Comprehensive Engineering Organization

Unanimous indorsement of the general principles expressed in the report of the American Society of Civil Engineers' Development Committee, which proposed a comprehensive national organization of all engineering bodies, has been voted by the District of Columbia association of members of the society.

At a meeting of the association held Dec. 19 in Washington, the Development Committee's report was discussed and the following resolutions were unanimously adopted and ordered transmitted to the Board of Direction of the parent society:

"Resolved, that the District of Columbia Association of Members of the American Society of Civil Engineers indorses the general idea proposed in a report of the Committee on Development, and recommends that the Board of Direction of the society report favorably on the adoption of the general principles of the report, subject to such modifications in details as may be found necessary in order to put the general principles into operation.

"Resolved, that in further advancement and adoption of the report of the Development Committee, the Board of Directors of the District of Columbia Association appoint a committee to make a systematic personal canvass of the local members, that they may be informed in regard to the report."

Public Service Commission To Contract for Bethlehem Bridge

According to a decision reached by the Pennsylvania Public Service Commission in the matter of the Lehigh River bridge at Bethlehem, the commission will be party to the construction contract, in place of the Bethlehem Bridge Commission. The latter, however, will be the agent of the former in directing and supervising the execution of the contract. C. W. Hudson, engineer to the bridge commission, states that the contract will probably be let about Feb. 25, 1920.

Technical Employees in Chicago Hear Union Leaders

At a mass meeting of technical employees held in Chicago Dec. 11 under the auspices of Chicago Local 14 of the International Federation of Technical Engineers, 700 were present and A. A. Cother, international organizer, who sent to *Engineering News-Record* a report of the meeting abstracted below, estimated that 66% of those in attendance were not members but "were anxious to learn of its aims and accomplishments."

The principal address was made by Anthony J. Oliver, president of the international federation, which is now composed of some 40 local unions representing a membership of over 6000. He contemplates full affiliation of the technical men's international with the railway employees' department of the American Federation of Labor at its biennial convention next April. The following extracts are taken from his address:

"I want to challenge these societies which propagate the doctrine 'that you must not fight for your rights as it is not ethical,' and that you should only beg, plead and coax for what you are entitled to and then, if it is finally denied, you should just supinely submit. I want to challenge these organizations to announce what remedy is left them after going through this formula of begging, pleading and coaxing, and I feel sure, my friends, that their answer would be that they have no further remedy except the remedy that is written in the constitution of the American Federation of Labor.

"The engineer and architect in high position and of confidence and trust were responsible for keeping down the salaries of the younger men entering into employment, in order that they might ingratiate themselves further into the good-will of the management. This selfish spirit, though conscientious as it may appear to be, has been the cause of our whole calling being the poorest paid calling, education and training considered, of any in the industrial world. . . .

"Some experts in economics, as well as leaders in various engineering societies, tell us that we are between capital and labor. This is a rank fallacy—a sort of sophistry propagated by those connected with the capitalistic class who would cajole you into believing you are one of them so that they may hold you in a distinct and separate class and then do with you what they will. This policy has been followed by employees for the past forty years. Every scheme possible has been tried to keep the technicians out of the labor movement. The strongest abstract reason advanced, and perhaps the most foolish, is that *it is against professional ethics*. I ask, my friends, if underbidding your fellow engineer, architect or draftsman for his job is professional ethics? Ethics, my friends, are like some rules of etiquette. The standards established by custom or ethics are strange, vague and varied. Engineers, architects and draftsmen have no ethical standard, no gentleman's agreement, or any other compact. They work for whatever they get, or in most cases what is given them, and at all times they were willing to underbid their fellow worker for the position he held."

Road Machinery Companies Cited for Unfair Competition

The Federal Trade Commission has cited the Universal Road Machinery Co., Kingston, N. Y., and the New England Road Machinery Co., Boston, Mass., in formal complaints alleging unfair methods of competition. The complaints allege that, in the case of the latter respondent, "gratuities, entertainments and money," had been given and offered to certain public officials with an idea to induce them to recommend the purchase of its machinery and to refrain from dealing with competitors. The allegation is also made that similar gratuities were given and offered to employees of the company's customers and prospective customers, and that the company had paid the expenses of public officials to their place of business to inspect their products. Practically the same allegations are made with respect to the Universal Road Machinery Co. Both respondents have 40 days in which to file answers, after which the case will be tried upon its merits before a final settlement.

Swamp-Drainage Constitutional Amendment Vote Announced

An official announcement of the vote on the swamp-drainage amendment in New York State at the November election shows that it was adopted by a vote of 718,150 to 590,134. This amendment enlarges the scope of Section 7 of Article 1 of the Constitution, which originally permitted the drainage of swamp lands by means of districts when the object was to conserve public health or safety. The amendment adds public welfare to the objects to be attained. Proceedings for the formation of drainage districts may be initiated either by the State Conservation Commission or by petition to the commission. Petitions may be filed by any public corporation in which lands to be drained are located or by any owner or owners of such lands. After due process, as set forth in Chapter 493 of the Laws of New York, for 1919, which is a substitute for Article 8 of the conservation law of 1911, the cost of drainage works may be assessed, either wholly or in part, upon the property benefited.

Highway Engineer Will Be Highest Paid State Official

R. J. Windrow, state highway engineer of Texas, will be the highest paid state officer of that state after Jan 1, when his salary will be increased to $10,000 a year, as granted by the State Highway Commission Dec. 16.

Sanitary Engineer for Newark Health Service Advised

Creation of separate bureaus of (1) health and hospitals and (2) public welfare at Newark, N. J., each under a head responsible to the mayor as director of the Department of Public Affairs (Newark has commission government) is advised in a report made by the Bureau of Municipal Research of New York as a part of a general survey of the city government. The bureau recommends the employment of a sanitary engineer to advise the health officer on all sanitary-engineering matters, including water-supply, sewage and garbage disposal, amendments to the building code, and housing.

Dedicates Perforating Patent to Public

The patent covering the process of perforating cross-ties and timber for the purpose of equalizing the penetration of wood preservatives has been dedicated to the public by O. P. M. Goss, the inventor, and six companies on the Pacific Coast which had obtained an interest from Mr. Goss in his ownership of the patent.

The process is used in perforating—or, rather, indenting—Douglas fir timbers which resist penetration. The perforation machine by which the depth of penetration is regulated was described in *Engineering News* of Jan. 27, 1916, p. 200, and *Engineering Record* of Sept. 9, 1916, p. 332.

Dates Are Set for Registration of Engineers in Iowa

The Iowa State Board of Engineering Examiners has issued an announcement calling upon engineers and surveyors to register with the board in compliance with the new Iowa registration law.

Under the provisions of the new law any engineer or surveyor may register for practice in Iowa up to Jan. 4, 1920, by merely showing his professional qualifications and without taking the state examination. After Jan. 4, all engineers and surveyors outside the State of Iowa must take the state examination before being allowed to practice.

Engineers now practising in Iowa are allowed until July 4, 1920, in order to register with the state board, but those within the State who have not registered on that date will not be allowed to practice. K. C. Kastberg, of Des Moines, is secretary of the new Iowa State Board of Engineering Examiners.

Civil Service Examinations

Canada. Instructor in mathematics, Royal Military College, Kingston, Ont., $1800 per year. File application with Civil Service Commission of Canada at Ottawa, Ont., before Dec. 26.

New York State. Assistant sanitary engineer, State Department of Health—$2000 per year, $2400 after July 1, 1920—Jan. 24. File applications with State Civil Service Commission at Albany by Jan. 20.

New York State. Engineering assistant, Office of State Engineer and Highway Department, $1080 to $1560 per year, Jan. 24. File application before Jan. 20.

New York State. Engineering draftsman, $1500 to $1800 per year, Jan. 24. File application before January 20.

New York State. Junior assistant engineer, grade 1, Office of State Engineer and Highway Department, $1620 to $1860 per year, Jan. 24. File application before Jan. 20.

New York State. Junior assistant engineer, grade 2, Office of State Engineer and Highway Department, $1980 to $2280 per year, Jan. 25. File application before Jan. 20.

United States

For United States civil service examinations, listed below, apply to the United States Civil Service Commission, Washington, D. C., or to any local office of the commission, for form 1312.

Architectural and structural steel draftsman, Lighthouse Service, Key West, Fla., $1560 per year, Jan. 6. File application before Jan. 6.

Fire-prevention engineer, office of Director of Purchase and Storage, War Department, duty throughout United States, $2500 to $4000 per year, Jan. 13. Application should be filed before that date.

ENGINEERING SOCIETIES

The San Francisco Association of Members of the American Society of Civil Engineers held the 1919 annual meeting Dec. 16. Ninety-eight members and guests were present. Resolutions were addressed to the parent society urging that the 1920 annual convention be held in Los Angeles. A special meeting was called for Jan. 20 to discuss with O. E. Meinzer, chief of groundwater division, United States Geological Survey, a proposed glossary of terms pertaining to groundwater. G. G. Anderson of Los Angeles spoke briefly on the Development Committee report. The election of officers for 1920 resulted as follows: President, M. M. O'Shaughnessy; first vice-president, F. R. Muhs; second vice-president, W. L. Huber. The paper of the evening was presented by Francis B. Smith, on the subject of "Building the Pearl Harbor Dry Dock."

The Grand Rapids Engineering Society, at its meeting Dec. 10 listened to an address by Virgil C. Marani, consulting engineer of the Gypsum Industries Association of Chicago, on the use of gypsum as a fire retardant. Mr. Marani said that only 2% of construction in the United States is of fire-resisting material, and that the fire loss of last year was $250,000,000. He added that there is really no such thing as fireproof construction and that the proper adjective is "fire-resisting." The society voted to offer its aid to the city commission in its problem of grade separation.

The Marion County, Ohio, Association of Engineers was organized Dec. 11. The object of the organization is to promote county improvement work in the engineering line. Following the adoption of a constitution, the following officers were elected: President, Thomas Cathers; vice-president, William E. Weston; secretary, Loring K. Warner; treasurer, Harry Stock. The membership includes civil, electrical, mechanical, architectural and chemical engineers.

The Engineers and Architects' Association, Los Angeles Chapter, American Association of Engineers, held open meetings on every evening during the week which ended Dec. 20, for purposes of discussing various matters, including the welfare of engineers. On each evening a member representing a different classification of engineers was in charge, and the discussion included the status of flood-control engineers, corporation engineers, railroad engineers, county engineers, and students of engineering.

The Union of Municipalities of the Province of Quebec was organized at Montreal Dec. 15. A long paper entitled "Why the Quebec Municipalities Should Have a Centralizing Bureau and Clearing House of Information" was presented by Charles A. Mullen, director of paving, Milton Hersey Co., Ltd., Montreal and Winnipeg. The paper was largely a plea for municipal coöperation in legislation and possibly in purchasing, insurance and in obtaining engineering services.

Calendar

Annual Meetings

BRIDGE BUILDERS' & STRUCTURAL SOCIETY, 50 Church St., New York City; Jan. 16, New York City.

AMERICAN SOCIETY OF CIVIL ENGINEERS, 29 W. 39th St., New York City; Jan. 21-22, New York City.

ENGINEERING INSTITUTE OF CANADA; General Secretary, Fraser S. Keith, 176 Mansfield St., Montreal; Jan. 27-29, Montreal.

AMERICAN ROAD BUILDERS' ASSOCIATION, 150 Nassau St., New York City; Feb. 9-13, Louisville, Ky.

AMERICAN WOOD-PRESERVERS' ASSOCIATION; Secretary-Treasurer, F. J. Angier, Mt. Royal Station, Baltimore; Feb. 10-12, Chicago.

AMERICAN CONCRETE PIPE ASSOCIATION; 210 South La Salle St., Chicago; Feb. 20-21, Chicago.

AMERICAN RAILWAY ENGINEERING ASSOCIATION; 1426 Manhattan Bldg., Chicago; March 16-18, Chicago.

The Rochester Engineering Society witnessed an exposition of the various processes in the manufacture of steel pipe, at its meeting Dec. 12, by F. C. Nicol of the National Tube Co. Mr. Nicol's address was illustrated by about 2500 ft. of film, and showed the successive steps from the mining of the ore to the finished product. The weekly luncheon, Dec. 23, was addressed by Winthrop K. Howe, chief engineer, General Railway Signal Co., who spoke on "Modern Railway Signals and Safety Appliances."

The Engineers' Club of Minneapolis, at its meeting Nov. 24, voted an appropriation in support of the educational work for the Department of Public Works bill now before Congress. A committee was appointed to assist the Joint Engineering Board of Minnesota in pressing upon that state's representatives in Washington the necessity for passing legislation which will permit the immediate utilization of the power now being wasted at the high dam at Fort Snelling.

The Engineers' Society of Milwaukee held its regular monthly meeting Dec. 18. S. E. Doane, chief engineer, National Lamp Works, General Electric Co., Nela Park, Cleveland, spoke on "The Beginning of a New Lighting Era, or, How Fast Can You See?"

The Detroit Engineering Society on Dec. 19 was addressed by E. L. Crosby, president and general manager, Detroit Electric Furnace Co., on "Electric Furnaces for Melting Brass."

The Baltimore Chapter of the American Association of Engineers at a recent meeting was addressed by Dr. J. B. Whitehead, dean of the engineering school, Johns Hopkins University, and John H. Gregory, professor of civil engineering. Other speakers on the program were Maj. Ezra B. Whitman, F. P. Paternall, and Otto G. Simonson. The chapter is planning the erection of a club house.

The Engineers' Club of Trenton, N. J., elected the following officers at its recent annual meeting: President, Alfred P. S. Bellis; vice-presidents, Harry F. Harris and C. R. Waller; secretary, Joseph E. English, and treasurer, James J. Johnson.

The Cleveland Engineering Society was addressed Dec. 23 by R. E. Carpenter, manager, Lynite Laboratories, Aluminum Castings Co., Cleveland, who spoke on "The Meaning of Industrial Research." The next regular meeting of the society will be held Jan. 6. W. L. Decker, construction engineer, American Shipbuilding Co., Cleveland, will then speak on "The Sterilization of Water by Means of Ultra-Violet Rays." The noon-day meeting Dec. 19 was addressed by M. B. Daly, president, East Ohio Gas Co., Cleveland, on "Cleveland's Natural-Gas Problems."

The Engineers' Society of Pennsylvania held Dec. 22 its monthly meeting, at which Joseph H. O'Brien, vice-president and chief engineer, Central Construction Corporation, spoke of experiences in railroad terminal construction in the United States and Canada.

The General Contractors' Section of the Builders' Exchange of Montreal, at a recent meeting elected as chairman for the ensuing year K. D. Church, president, Church Ross Co., Ltd., engineers and contractors. Other members of the executive committee are John Allan, H. Fussing, Maj. E. G. M. Cape and E. B. Evans.

The District of Columbia Association of Members of the American Society of Civil Engineers, at its meeting, Dec. 19, in Washington, elected the following officers: President, David S. Carll; vice-president, John C. Hoyt; secretary-treasurer, James H. Van Wagenen.

PERSONAL NOTES

EARLE L. WATERMAN, who received his discharge as captain, Sanitary Corps, U. S. A., last August, has become associate professor of public health with the extension division, State University of Iowa, at Iowa City. He was previously stationed at Camp Meade, Maryland, as camp sanitary engineer.

W. D. NEVES, recently elected city engineer of Greenville, S. C., has assumed his duties, succeeding W. F. B. HAYNESWORTH, who resigned to become city commissioner of public works, Winston-Salem, N. C., as previously noted.

W. E. HOWE, for several years assistant city engineer of Topeka, Kan., has been appointed county engineer of Neosho County, Kansas, with headquarters at Erie.

L. G. WATTERS has been elected controller of roads in Floyd County, Georgia.

EDWARD NOLAND, Memphis, Tenn., has been appointed superintendent of the Mississippi River division of the Mississippi-Warrior Waterways Association, succeeding R. B. DOWNS, St. Louis.

Dr. S. W. WELCH has resigned as sanitary engineer, Alabama State Board of Health.

GEORGE H. BROWN, principal assistant engineer, Pennsylvania R.R., at Altoona, Penn., has become engineer maintenance of way, bridges and structures.

HERBERT S. CROCKER and FRANCIS S. CROWELL announce an association as consulting engineers with offices at 101 Park Ave., New York City. CROCKER & CROWELL will engage in the design and supervision of industrial and engineering features of proposed investments, and will act as owners' representative in the administration of contract work let on a percentage basis.

THOMAS FLEMING, JR., has withdrawn from the firm of CHESTER & FLEMING, engineers, Pittsburgh, to become associated with the Oil Well Supply Company.

JOHN C. WINSTON has been appointed director of the Department of Public Works of Philadelphia by Mayor-elect Moore, to take office Jan. 1. Mr. Winston has been president of the John C. Winston Co., publishers, Philadelphia, for many years. He was one of the originators of the Philadelphia reform movement and served as chairman of the Committee of Seventy.

DANIEL E. DAVIS, previously captain, Construction Division, U. S. A., who has been on the staff of CHESTER & FLEMING, engineers, Pittsburgh, for several years, has become a member of the firm following the withdrawal of Thomas Fleming, Jr., as noted elsewhere. JOHN T. CAMPBELL, for several years in charge of designs has also become a member of the firm, and the partnership will continue to operate under the firm name of Chester & Fleming, with J. N. Chester, J. T. Campbell, D. E. Davis, and J. F. Laboon as the partners.

THOMAS H. KEHOE has resigned from membership in the Board of Water Commissioners of Hartford, Conn.

MARVIN L. CHASE has resigned as state hydraulic engineer and chairman of the state reclamation board of Washington.

NORMAN P. GERHARD, previously resident engineer for JAMES H. FUERTES, consulting engineer, New York City, on municipal work for the City of Cumberland, Md., has engaged in private practice with headquarters at Scarsdale, N. Y., and is associated with WILLIAM PAUL GERHARD, consulting engineer, 311 Audubon Ave., New York City. He was assistant engineer, Board of Water Supply, New York City, on the construction of the Catskill water-supply, from 1906 to 1918.

BENJAMIN O. JOHNSON has received an appointment as colonel in the United States Army, according to word received recently by Mrs. Johnson, Worcester, Mass. Colonel Johnson has been in Siberia two years, having been sent there as a major to aid in the reorganization of the Transsiberian Ry. He is stationed at present at Irkutsk.

W. C. WEST, of Buckhannon, W. Va., has been named road engineer for Houghton County, Michigan. THOMAS COON, acting engineer for the past two years, will be his assistant.

F. R. JONES, formerly master mechanic of the Victory Plant, Bethlehem Shipbuilding Corporation, has been appointed plant engineer at the Quincy works of the same corporation.

NORMAN MCL. R. WILSON has been appointed chief engineer of the water-works department, Brantford, Ont. For the past 10 years he has

been inspector and water-works engineer for the Canadian Fire Underwriters' Association, Toronto, Ont.

WILLIAM A. WORTHINGTON, head of the sewer branch, works department, Toronto, Ont., has resigned and will enter private practice as a consulting engineer on water-works and sewage.

O. A. FARIS, for the past five years chief engineer of the Twin Falls Canal Co., Idaho, has opened an office in Boise, Idaho, and is associated with R. W. FARIS, consulting engineer. Special attention will be given by the new firm to the design and construction of concrete structures, though it will engage also in general engineering practice.

H. S. PERRY has been named assistant to A. H. HINKLE, head of the maintenance department of the Indiana State Highway Commission.

PROF. ALLAN R. CULLIMORE, dean of engineering, Delaware College, has resigned to become director of the Newark, N. J., Technical College. He will assume his new duties Feb. 1, 1920.

T. J. SKILLMAN, division engineer, Pennsylvania R.R., at Jersey City, N. J., has been appointed principal assistant engineer at Altoona, Penn., succeeding GEORGE H. BROWN, appointed engineer, maintenance of way, as noted elsewhere.

GANNETT, SEELYE & FLEMING, of Harrisburg, Penn., have opened a branch office in Memphis, Tenn., under the direction of T. E. SEELYE.

Dr. E. B. JOHNSON has been appointed sanitary engineer, Alabama State Board of Health, succeeding Dr. S. W. WELCH, resigned, as noted.

JAMES R. BROWN, formerly first lieutenant of engineers, A. E. F., has been appointed superintendent of streets of Binghamton, N. Y., succeeding FRANK D. LON.

HAROLD F. BLANCHARD, formerly of the *Motor World*, has become chief engineer of the automotive department, Detroit office, of MANN & MACNEILLE, architects and construction engineers, New York City, who have added this department to render building service to automobile dealers and garage men.

OBITUARY

ANDREW MUIR, pioneer railroad tunnel contractor of California, died in St. Paul, Minn., Dec. 15, at the age of 82. Early in life he engaged in work in South America and later in gold mining in California and Nevada. He built the Bozeman and Muir tunnels of the Northern Pacific in Montana. In 1900 he constructed the Franklin tunnel for the Santa Fé, and he was one of the builders of the old Santa Cruz narrow-gage line, known as the Dumbarton system. He had resided in St. Paul for the past 35 years.

ROBERT VAN BUREN, for almost half a century in the employ of the Brooklyn, N. Y., water-works prior to his voluntary retirement in 1914, died recently at Norwalk, Conn., at the age of 77. Mr. Van Buren was graduated from Rensselaer Polytechnic Institute, Troy, N. Y., in 1864. In the latter part of the next year he became an employee of the old Brooklyn Water Board, and two years later was made chief engineer of the Brooklyn Department of City Works. At the time of his retirement from public service he was the borough engineer of the Department of Water Supply, Gas and Electricity, Brooklyn, and during his term of service had much to do with the laying out of the original water-main systems.

HERBERT BUTLER, formerly resident engineer with the Illinois State Highway Commission, and more recently connected with the Division of Valuation, Interstate Commerce Commission, died recently in Toronto, Can. He was 49 years of age.

Combined Water Meter and Curb Cock Box

A combined water meter and curb or corporation cock box known as the No. 11 Oval Southland Clark Meter Box has been put on the market by the H. W. Clark Co., Mattoon, Ill. Ready access to the corporation cock is afforded, but the meter can be got at only by the use of a special key which serves also to lift the cover to the box. Removal of the key locks the box. Provision is made for the removal of the entire box without injury to the walk or pavement in which it is set.

BUSINESS NOTES

THE MECHANICAL MEMORY SYSTEMS CO. has been incorporated, with offices at Aurora, Ill., and will manufacture visible control systems.

THE SINCLAIR REFINING CO., Chicago, announces the establishment of an asphalt sales department to handle the output of the Meraux, La., refinery. The plant will be used to refine asphalt from specially selected maltha from the Panuco field, Mexico.

E. F. FITZPATRICK has been appointed manager of the asphalt sales department recently created by the Sinclair Refining Co., Chicago. J. M. WOODRUFF, formerly manager of the publicity and paving departments of the Standard Asphalt and Refining Co., has been selected as assistant to Mr. Fitzpatrick.

TRADE PUBLICATIONS

The following companies have issued trade publications:

THE MCALEAR MANUFACTURING CO., Chicago, Ill.; catalog No. 25; covers steam, water and air specialties for high- and low-pressure heating, power plant and devices for plumbing installations; also a special catalog, "Twenty-five Years of Know How," covering vacuum, vapor and air light heating specialties.

THE BAILEY METER CO., Cleveland, Ohio; bulletin No. 30, 8 x 10½ in., illustrated, 15 pages; explains uses and operative principles of fluid meters for low-pressure gas and air.

THE SIMPLEX EJECTOR CO., Chicago; catalog, 6 x 9 in., 32 pages, illustrated, of the "Simplex" automatic pneumatic sewage ejector.

THE LINK-BELT CO., Chicago; catalogs Nos. 375 and 380, each 6 x 9 in., 100 pages, illustrated; No. 375 describes "Link-Belt Labor-Saving Elevators and Conveyors," and No. 380 tells of "Link-Belt Electric Hoists and Overhead Cranes."

THE WALTER A. ZELNICKER SUPPLY CO., St. Louis, Mo.; bulletin No. 270; 3½ x 8½ in., illustrated, 56 pages; catalog of plant and equipment and accessories for sale.

THE MERCURY AVIATION CO., Los Angeles, Calif.; booklet, 9 x 12 in., illustrated; descriptive of commercial possibilities for the airplane, containing information on uses of airplanes and instruction given.

THE AMERICAN TRUCK BODY CO., Martinsville, Va.; bulletin No. 26, 4 x 8½ in., on "The Fontaine Demountable Truck Body."

THE NELSON VALVE CO., Philadelphia, Penn.; book, 5 x 8 in., illustrated; price quotations on bronze, iron and steel, gate, globe and check valves.

THE WHITING FOUNDRY EQUIPMENT CO., Harvey, Ill.; catalog No. 150 (superseding No. 129), 6 x 9 in., illustrated; on construction and uses of side-blow converter.

THE GRANITEX COMPANY, INC., New York City; pamphlet, 5 x 9 in.; describes new waterproofing mixture for cement, "Adamantex."

THE STOW MANUFACTURING CO., Binghamton, N. Y.; bulletins Nos. 103 and 104, 6 x 9 in., 30 and 60 pages, respectively, illustrated; specifications on motor-driven portable tools, and uses of the flexible Stow shaft.

THE WESTERN WHEELED SCRAPER CO., Aurora, Ill.; catalogs Nos. 44 and 45, 8½ x 11 in., 15 pages each, illustrated; descriptions of earth- and stone-handling machinery, including portable crushers, screening plants and industrial railways especially adapted to highway construction uses.

Bridges (Continued)

Wis., Appleton—Outagamie Co. voted bonds to build following bridges:
Baker Bridge, Cicero Twp., $1056.
Capman Bridge, Liberty Twp., $505.
Else Bridge, Liberty Twp., $567.
Evans No. 1 Bridge, Seymour Twp., $899.
Evans No. 2 Bridge, Seymour Twp., $877.
Knoke Bridge, Liberty Twp., $920.
Kuhn Bridge, Cicero Twp., $817.
Pfeiffer Bridge, Buchanan Twp., $788.
Reimer Bridge, Ellington Twp., $772.
Zebel Bridge, Seymour Twp., 883.
W. Hebbe Bridge, Maple Creek Twp., $558.
Finger Bridge, Maple Creek Twp., $1138.
Sickle Bridge, Oneida Twp., $1551. A. G. Brusewitz, comr.

Wis., Luxemburg—Town and Kewaunee Co. (Kewaunee) having plans prepared by Wisconsin Highway Comn., Madison, building Brandle Bridge, to include three 40 ft. concrete girder spans, baluster railing and 24 ft. roadway. About $15,000. M. Shaw, Algoma, co. highway comr.

Wis., Tomahawk—State Highway Comn., Madison, plans to rebuild Tomahawk Bridge, to have six 70 ft. plate girders. About $57,000.

Wis., Wausau—Marathon Co. plans to build bridge in Maine, Emmet, Wein, Frankfort, Hamburg, Wausau, Texas, Cassel, Weston, Kronenwetter and Knowlton Twps., 2 bridges in Bern, Reitbrick, Norrie, Eau Pleine, Kronenwetter, Harrison, Day and Cleveland Twps., 3 in Day Twp. and 4 in Halsey Twp. Total cost, $39,986. Cost will be borne equally by county and townships.

Tex., Ballinger—Runnels Co. having plans prepared building 518 ft. rein.-con. and steel girder bridge, 19 ft. wide, over Colorado River, including removing present structure and addition to present sub-structure. Work involves 805 cu.yd. Class "A" and 355 Class "B" concrete, 139,720 lb. structural and 99,330 lb. reinforcing steel, 1 approach with seven 28½ ft. girder spans, 1 with four 28½ ft. girder spans and two 99 ft. 2 in. steel spans, etc. About $61,432. Hess & Skinner, Southwestern Life Bldg., Dallas, engrs.

Wash., Tacoma—Comrs. Pierce Co. soon let contract building steel bridge over Puyallup River, at Helman-Bowman Crossing. About $35,000. E. A. White, co. engr.

Oregon—State Highway Comn., Portland, soon lets contract building 80 ft. steel span with 280 lin.ft. rein.-con. viaduct over North Yamhill River on McMinnville-West Dayton Rd., Yamhill Co., involving 750 cu.yd. class "A" and 350 cu.yd. class "B" concrete, 60,000 lb. structural steel, 125,000 lb. reinforcing steel, 3100 lin.ft. wooden piling, 724 lin.ft. concrete handrail, etc., cost $10,000; also 1 pile trestle over Chehalem Creek on West Side Highway near Newberg, involving 323 lin.ft. wood deck and 3300 lin.ft. timber piles. C. B. McCullough, Salem, engr.

Cal., San Miguel—San Luis Obispo Co. (San Luis Obispo) plans to build concrete bridge over Salinas River, east of here. About $115,000. W. Burch, co. engr.

Cal., Shandon—San Luis Obispo Co., (San Luis Obispo) plans to build concrete bridge over Estrella Creek, on Shandon-Paso Robles Rd., near here. About $44,000. J. H. Bradhoff, superv.

N. S., Annapolis—Provincial Government, Halifax, plans to build highway bridge over Allen's Creek, to have two 100 ft. spans, rein.-con. flooring and sidewalks. Work involves 67 tons steel. About $12,600. J. M. Rowland, Halifax, engr.

Ont., Simcoe—City election Jan. 5 to vote on $70,000 by-law for 5 steel and concrete bridges. A. Bancroft, alderman.

BIDS DESIRED

Michigan—Until Dec 31, by F. F. Rogers, state highway engr., Lansing, building State Trunk Line Bridge No. 258 over Dead River Mill Pond, 6 mi. north east of Negaunee, 265 ft. long, 20 ft. wide, involving 123 cu.yd. rein.-con., etc.

Kan., Leavenworth—Until Jan. 5, by Leavenworth Co., building one 35 ft. rein.-con. "T" girder bridge and 1 through girder bridge, with three 40 ft. spans. About $25,000. L. C. Clarke, Leavenworth, engr.

Kan., Secenca—Until Jan. 6, by Comrs. Nemaha Co., building bridges and culverts on 8 mi. Woodlawn Rd., Sects. A, B and C. About $96,000. L. P. Price, Seneca, engr.

N. S., Annapolis—Until Jan. 5, by Provincial Highway Bd., Halifax, building superstructure, for following bridges, 6 fixed spans of 102 ft., 1 of 109 ft., 1 of 157 ft., 1 of 294 ft., and 1 swing span of 157 ft. Work involves 849 ton steel, etc. About $116,000. J. M. Rowland, Halifax, engr.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

Pennsylvania—State Highway Dept., Harrisburg, received bids building bridges (a) Armstrong Co., Parks and Gilpin Twps.; (b) Berks Co., Union Twp., (c) Bucks Co., Falls Twp., (1) Sta. No. 704, (2) No. 768, from Farris Eng. Co., Empire Bldg., Pittsburgh, (a) $9877; F. S. Wilson, Kittanning, (a) $10,833; G. W. Ensign, Inc., Kirchey Bldg., Harrisburg, (a) $12,493, (b) $39,270, (c) $33,666, (c-2) $43,167; O. B. S. Co. Phila., (b) $31,157, (c-1) $24,377, (c-2) 28,541; U. G. I. Contg Co., Phila., (b) $31,197.

★**W. Va., Wayne**—Comrs. Wayne Co. let contract building stone masonry for 3 sets of bridge abutments on Project G-1 known as Upper Workman, Lower Workman and Sidney Booth bridge sites, to Lambert & Co., Huntington, $36,635.

★**O., Columbus**—Norfolk & Western R. R., Roanoke, Va., let contract building 600 ft. bridge, 50 ft. wide, steel superstructure, concrete abutments, here to C. R. Cummins Co., Leader-News Bldg., Cleveland. About $200,000. Incorrectly noted in our issue of Dec. 11.

★**Mich., Okemos**—Ingham Co. let steel contract for 90 ft. span low truss steel bridge, with two 20 ft. rein.-con. abutments, 18 ft. wide, over Red Cedar River, near here, involving 37 tons steel, to Brookville Bridge Co., Brookville, O., $4884; concrete work, involving 233 cu.yd. rein.-con., to E. C. Nolan & Son, Detroit, $8030.

★**Ill., Dixon**—Lee Co. let contract repairing Galena Ave. Bridge, here, to Freeport Bridge Co., Freeport, $34,869.

★**Ill., Findlay**—Town let contract building bridge between Sullivan Twp., Moultrie Co. and Okaw and Windsor Twps., Shelby Co., consisting of two 120 ft. spans on center line, 18 ft. roadway, 32 ft. abutments and 34 ft. pier, involving 843 cu.yd. concrete, 46,140 lb. reinforcing steel, to Rochester Bridge Co., Rochester, Ind. About $41,000.

★**Minn., Duluth**—W. H. Borgen, aud. St. Louis Co., let contract building bridges on State Rd. No. 1 as follows: One over St. Louis River, involving 175,000 lbs. structural steel and 324 cu.yd. rein.-con., to M. A. Adams Co., Andrus Bldg., Minneapolis, cost $35,643; 1 over Whitefact River, 75,000 lbs. structural steel and 212 cp.yd. concrete, to Iowa Bridge Co., 717 McKnight Bldg., Minneapolis, $17,700; 4 over Hellwigs Creeks, 659 cu.yd. rein.-con., to J. J. Fredin, Jr., Duluth, $5229, $5886, $5034 and $5684 respectively; 3 bridges involving 410 cu.yd. concrete and 1 bridge involving 20,000 lbs. structural steel and 140 cu.yd. concrete to E. J. Fennelly, Atkins, $3290, $4980, $5950 and $8150 respectively.

★**Ariz., Clifton**—See "Streets and Roads."

★**Wash., Walla Walla**—Walla Walla Co. let contract building 1 concrete bridge at Lowden, 1 at Waitsburg and 3 over Coppel Creek at Dixie, to Union Bridge Co., foot of Fenwick and Kenton Sts., Portland, Ore., $62,267.

Streets and Roads

PROPOSED WORK

Pennsylvania—State Highway Dept., Harrisburg, received no bids Dec. 16, building roads in counties as follows:
Crawford Co., 18,514 ft. 1 course rein.-con. and Hillside vitr. brick, East Mead Twp.
Fayette Co., 9432 ft. 1 course rein.-con. Bullskin and Upper Tyrone Twps.; 20,966 ft. 1 course rein.-con. and Hillside vitr. brick, Dunbar Twp.
Greene Co., 10,620 ft. 1 course rein.-con, Center Twp.
McKean Co., 14,800 ft. 1 course rein.-con. Eldred Twp.
Warren Co., 40,485 ft. 1 course rein.-con. Farmington and Sugar Grove Twps.; 12,012 ft. 1 course rein.-con, Tidioute Boro.; 22,287 ft. 1 course rein.-con. and Hillside vitr. brick, Farmington and Pine Grove Twps.

Pa., Monroe—City plans to grade and pave 20 mi. road on Pocono Mountain, 16 ft. wide, waterbonded macadam on concrete base. About $500,000.

W. Va., Parsons—Tucker Co. having plans prepared by F. A. Parsons, co. engr., grading and draining 9 mi. Haddix Rd. About $60,000.

North Carolina—State Highway Comn., Raleigh, plans to gravel 12 mi. road from Orange Co. line to Pittsboro, Chatham Co.; 22 mi. Pittsboro to Silver City and 16 mi. Lenoir to Catawba, Caldwell Co.; 18 mi. Hamlet to Drowning Creek, Watauga Co.; 16 mi. Lenoir to Wilkesboro, Halifax Co.; hard surface 5.5 mi. Roanoke to Weldon, Richmond Co.; gravel or sandclay 13 mi. Boone to Caldwell Co. line, Watauga Co. 10 mi. Mocksville to Yadkin River Bridge, Davie Co., also build concrete bridge over Yadkin River at Fulton Ferry. W. S. Fallis, state highway engr.

N. C., Greensboro—Comrs. Guilford Co. plan to hard surface 20 mi. Greensboro-Winston-Salem Rd. About $200,000. W. C. Boren, chn.

N. C., Winston-Salem—Forsyth Co. plans to hard surface 20 mi. Winston-Salem-Greensboro Rd. About $200,000. D. W. Harmon, co. engr.

O., East Liverpool—City Council plans to pave 4140 ft. West 6th St. from Diamond to Jefferson Sts., 36 ft. wide, brick block on concrete base. About $28,806. J. W. George, city engr.

O., Lisbon—Columbiana Co. plans to widen and resurface East Liverpool-Wellsville Rd., pave 2.73 mi. Unity-Springfield Rd.; grade 4½ mi. Lisbon-Salineville Rd., 7.2 mi. Hanover-Salem Rd., and 7½ mi. Columbiana-Lisbon Rd. About $362,000. G. Armstrong, co. engr.

Mich., Springwells—City having plans and estimates prepared by G. Jerome, engr., 1331 Majestic Bldg., Detroit, for grading, shaping and surfacing with concrete 3½ mi. Michigan Ave. from Detroit city limits to western corporation line, double roadway each 16 ft. wide. About $100,000.

Ill., Benton—City plans to pave 100,000 sq.yd. streets. About $500,000. C. B. Mantz, city engr.

Ill., Sesser—City receives bids about February building sidewalks. Cost $40,000. C. B. Mantz, Benton, engr.

Ill., West Frankfort—City will pave 60,000 sq.yd. and build storm sewers. About $400,000. C. B. Mantz, Benton, engr.

Wis., Crandon—Forest Co. plans to grade Elvoy Dam Rd., cost $1080, Alvin-Florence Rd., $2161, Alvin Twp.; Crandon-North Crandon Rd., Crandon Twp., $2334; Hiles-Gagen Rd., Hiles Twp., $2161; Loana-Cavour Rd., Laona Twp., $1037; Nashville-Crandon Rd., Nashville Twp., $2593; Armstrong Creek-North Crandon Rd., Caswell Twp., $3602; Newald-Long Lake Rd., Newald Twp., $3085; North Crandon-Alvin Rd., $4321; Bartline-Choate Rd., Wabeno Village, $648; surfacing Main St., $324; Soperton-Otter Lake, east, $2376, Wabeno Village; building concrete bridge west of Laona, Lanoa Twp., $778; concrete bridges and culverts, Wabeno Village, $972. F. J. Rogers, comr.

Wis., East End—Douglas Co. plans to concrete and gravel surface Trunk Highway No. 11, commencing at easterly limits near Bear Creek, in Itasca and extending along Itasca Rd. and Grand Ave. to Spalding Rd., cost $475,000; pave Trunk Highway No. 35, concrete, $220,000; gravel Lakeside Rd., $100,000; Brule-Highland Rd., $50,000; Borea Rd., $60,000; Union St., $20,000; Trunk Highway No. 10, $70,000 and grading Moose River Rd., $25,000.

Wis., Janesville—Rock Co. plans to build Beloit-Monroe Rd., Avon Twp., $6250; Milton-Whitewater Rd., Lima Twp., $7500; Evansville-Albany Rd., Magnolia Twp., $5359, Beloit-Monroe Rd., Newark, Twp.; $7500; Footville-Magnolia Rd., Center Twp., $3000; Edgerton-Stoughton Rd., Fulton Twp., $3000; Middle Rd., Harmony Twp., $3000; Milwaukee Rd., Johnstown Twp., $6000; Evansville-Brodhead Rd., Magnolia Twp., $3000; Madison Rd., Plymouth Twp., $3000; Edgerton-Stoughton Rd., Porter Twp., $3000; Shopiere-Clinton Rd., Turtle Twp., $3000; Haufman Rd., Spring Valley Twp., $1931, and Magnolia-Evansville Rd., Union Twp., $3000. C. E. Moore, comr.

Wis., Kenosha—Kenosha Co. plans to concrete surface Geneva Rd., Bristol Twp., cost, $6300; Milwaukee Rd., $41,000, Sheridan Rd., $4000, Wilmot Rd., $2000, all in Pleasant Prairie Twp.; Burlington Rd., Somers Twp., $67,500; gravel surface Burlington-Kenosha Rd., Brighton Twp., $3150; Wilmot Rd., Randall Twp., $4780; Wilmot Rd., Salem Twp., $5250; Powers Lake Rd., Wheatland Twp., $2400; gravel macadam all county roads except Trunk Highways, Paris Twp., $7240, and all county roads except Trunk Highways, Bristol Twp., $5120. J. F. Herzog, comr.

Wis., Portage—Columbia Co. plans to gravel Surface Trunk Highway No. 65, Caledonia Twp., $3000; clay surface Trunk Highway No. 65, Ft. Winnebago Twp., $3000; grade, drain and gravel surface Trunk Highway No. 44, Scott Twp., $3000, Trunk Highway No. 29, Portage, $4562; grade, drain and surface Portage-Merrimac Rd., Columbus Twp., $3000, Portage-Merrimac Rd., Caledonia Twp., $3000, Rio-Randolph Rd., Courtland Twp., $2700, Co-

Streets and Roads (Continued)

lumbus-Randolph Rd., Fountain Prairie Twp., $1283, Wyocena-Madison Rd., Lowville Twp., $3000, West Town Line Rd., Otsego Twp., $3000, Main St., Fall River Village, $750. J. T. Henton, comr.

Minn., Madelia—City having plans prepared paving various streets. About $100,000. Bids will be received on all types of pavement. Bradley Eng. Serv., Weber Bldg,. St. Cloud, engrs.

Minn., Thief River Falls—City having plans prepared for 97,852 yd. paving. Bids will be received on all types of pavement. Bradley Eng. Serv., Weber Bldg., St. Cloud, engrs.

Neb., Cozad—City soon lets contract improving 19 blocks Main and G Sts., 30, 50 and 60 ft. wide, involving 4750 lin.ft., 6 x 20 in. concrete curbing, 6700 lin.ft. concrete curbing and guttering, 6000 cu.yd. earth excav., 29,500 sq.yd. vitr. brick or asphalt. About $125,000. J. R. Marreauly, Grand Island, engr.

Mo., St. Joseph—Buchanan Co. having plans prepared building 20.7 mi. St. Joseph-Atchison Rd., concrete on 5 in. concrete base, cost $818,616; 10.7 mi. road from St. Joseph to Faucett, asphaltic concrete, $400,000; both 18 ft. wide. J. D. Mohler, 1522 South 25th St., engr.

Texas—R. J. Windrow, state highway engr., Austin, soon lets contract surfacing 5.9 mi. Highway No. 3, Federal Aid Project No. 15, about 20 ft. wide, gravel and bituminous. Cost to exceed $25,000.

Tex., Edna—Jackson Co. voted $60,000 bonds to build Highway No. 12. W. W. McCrory, co. judge, W. C. Youngs, Edna, engr.

Tex., Kaufman—Kaufman Co. plans to improve and drain 18.1 mi. Highway No. 15, from Van Zandt Co. line to Big Bushy Creek, 15 ft. wide, 14.32 mi. to be surfaced with bituminous topping, involving 28,240 cu.yd. gravel, 141,500 sq.yd. bituminous macadam, 1160 lin.ft. piling, 90 cu.yd. class A concrete, including steel, etc. About $172,000. T. Bartlett, Kaufman, engr.

Tex., Madisonville—Madison Co. had plans prepared building 25 mi. Highway No. 32 and laterals. Bonds for $50,000 voted for project. J. M. Roberts, co. judge. P. A. McCarthy, Lufkin, engr. Noted July 3.

Colorado—State Highway Dept., Denver, plans to pave roads in following counties:

Adams and Arapahoe Counties, 1.17 mi. Federal Aid Project No. 31, between Denver and U. S. A. General Hospital No. 21, 18 ft. wide, involving 162 lin.ft. 24 in. corrugated metal culverts, 2400 cu.yd. combined earth excav., 12,200 sq.yd. 1 course plain concrete and 19 cu.yd. concrete culvert headwalls, cost $43,957.

Boulder Co., .799 mi. Federal Aid Project No. 37, east from Boulder, 18 ft. wide, 726 cu.yd. earth excav., 8440 sq.yd. concrete, 208 cu.yd. gravel surfacing, 30 lin.ft. 15 in. corrugated iron pipe, 1 bridge, with two 30 ft. I-beam spans, concrete piers and abutments, etc., $44,810; (state to furnish all cement); 1.523 mi. Federal Aid Project No. 36, between Longmont and Denver, 18 ft. wide, 100 lin.ft. 18 in. corrugated metal culverts, 3409 cu.yd. combined earth excav., 16,054 sq.yd. concrete, 397 cu.yd. gravel shoulders, etc., $44,855.

Eagle Co., 2.759 mi. Federal Aid Project No. 78, between Cliff and Minturn, 18 ft. wide, 818 lin.ft. 24 in. corrugated metal culverts, 34,496 cu.yd. combined earth and 14,263 cu.yd. solid rock excav., 14,505 cu.yd. earth borrow, 9 acres clearing, 262 cu.yd. concrete culvert headwalls, etc., $114,503.

Elbert Co., 16.88 mi. Federal Aid Projecta No. 50, between River Bend and Kuhn's Crossing, 24 ft. wide, 80,000 cu.yd. combined earth excav., 58 cu.yd. concrete headwalls for culverts, 770 lin.ft. 15 in. and 180 lin.ft. 24 in. corrugated metal culverts, 9 bridges with 20 ft. spans, etc., $48,447.

Larimer Co., 1.962 mi. Federal Aid Project No. 33, south from Ft. Collins, 18 ft. wide, 2939 cu.yd. combined earth excav., 20,780 sq.yd. concrete, 518 cu.yd. gravel shoulders, 36 lin.ft. 18 in. corrugated metal culverts, etc., $74,682; (state to furnish cement).

Ouray Co., 1.155 mi. Federal Aid Project No. 65, between Ouray and Silverton, 18 ft. wide, 5991 cu.yd. combined earth and 15,292 cu.yd. solid rock excav., 1875 cu. yd. earth surfacing, 160 lin.ft. 15 in. and 20 lin.ft. 24 in. corrugated metal culverts, 1 bridge with 21 ft. span, etc., $68,433.

Summit Co., 2.093 mi. Federal Aid Project No. 28, between Dillon and Kremmling, 24 ft. wide, 7730 cu.yd. combined earth and 7730 cu.yd. solid rock excav., 511 lin.ft. 15-36 in. corrugated metal culverts, 52 cu.yd. concrete headwalls for culverts, $34,377, also 2 bridges with over 20 ft. spans, $4900 and $6100 respectively. J. E. Maloney, state highway engr.

Idaho, Waha—Comrs. Waha Tammany Highway Dist. plan to pave 7 mi. Waha-Tammany Highway to Lake Waha, gravel or waterbound macadam. Cost to exceed $75,000. G. W. Wallace, Lewiston, comr.

Wash., Pullman—City plans election soon to vote on $15,000 bonds to grade and pave roads within city limits. C. M. Hooper, city engr.

Ore., Enterprise—City Council plans election to vote on $50,000 addition bonds to pave with concrete, asphaltic concrete or bitulithic 35 blocks of side streets and alleys. L. C. Kelsey, 410 Selling Bldg., Portland, engr.

Ore., Klamath Falls—City sold $97,031 bonds to drain and pave side streets, concrete and cinder macadam. J. Cleghorn, city engr.

Ore., Medford—Jackson Co. plans to expend $180,000 for road work to be borne as follows: 1 mill market road levy, $55,000; general road tax, $82,500; road district tax, $42,000; sundry sums, $500. Work will include grading and paving with gravel or macadam unpaved portions of county and market roads.

Ore., Milton—City voted $16,000 bonds to pave and drain streets. S. D. Peterson. city atty.

Ore., Pendleton—Umatilla Co. having preliminary plans prepared for location and survey of highway from Pilot Rock through Albee and Ukiah to north fork of John Day River, connecting with Grant Co. road leading to John Day and Canyon City. Cost to exceed $50,000. M. O. Bennett, Pendleton, dist. highway engr.

Ore., Pendleton — Umatilla Co. having plans prepared by A. E. Perry, co. surveyor, for grading and graveling 3 mi. road from Helis to Cold Springs-Pendleton Highway. About $12,000. Farmers along route agree to pay $6000 for grading, county to pay for graveling.

Ore., Portland—City plans to grade and pave East 72nd St. from point 100 ft. east along west line of Katherine, Kensington and Brainard Additions to East Glisan St., concrete or asphaltic concrete, cost $7033; Boise St. from East 39th St. to west line of 42nd St., S. E., $4719. O. Laurgaard, city engr.

Ore., Portland—Multnomah Co. plans to improve Columbia River Highway, cost $37,500; Bertha-Beaverton project, $62,500; 16th St.-Patton Rd. Dr., $55,000; Foster Rd., $42,000; St. Johns River Rd., $43,700; Fairmount Blvd., $140,000; Columbia Blvd., $55,900. Work includes grading, draining and paving with concrete, asphaltic concrete or waterbound macadam. W. A. Eatchel, co. roadmaster.

Ore., Tillamook—Bayocean Rd. Dist. plans to grade and gravel 3 mi. Bayocean Rd. About $30,000. F. B. Stranahan, city recdr.

Ore., Vale—Malheur Co. plans to grade, gravel and build roads. About $100,000. C. C. Meuller, co. treas.

California—State Highway Comn., 515 Forum Bldg., Sacramento, soon receives bids building 7.25 mi. Division Creek Sect. of Inyo Co. Highway, from Independence to end of Indian allotment, to include grading and macadamizing. First unit of road, 2.73 mi., will be built by day labor. Cost to exceed $50,000. A. B. Fletcher, highway engr.

Cal., Los Angeles—Bd. Supervs. Los Angeles receives bids in January or February grading, draining and paving 12,680 ft. Francisquito Ave., oiled macadam. County furnished 9400 ton crushed rock. F. H. Joyner, co. engr.

Cal., Los Angeles—Bd. Pub. Wks. receives bids about January or February, paving 14 blocks San Pedro St., between Jefferson St. and Vernon Ave., 5 in. bituminous base and 2 in. asphalt surface. H. B. Ferris, secy. A. C. Hansen, city engr.

Cal., San Diego—City voted $80,000 bonds to pave 1.9 mi. Tide St., concrete base. F. Rhodes, city engr.

Cal., San Diego—San Diego Co. voted $2,300,000 bonds to pave 135 mi. roads. J. B. McLees, clk.

Cal., San Leandro—City plans election to vote on $10,000 bonds to widen East 4th St.

Cal., San Luis Obispo—Bd. Supvs. San Luis Obispo Co. having preliminary plans prepared building Arroyo Grande-Corbit Canyon Rd., 18 ft. wide, Arroyo Grande, $12,600, 2 mi. road from Ontario House to County Wharf, 18 ft., Avila, $16,400, 13.25 mi. road from Bank and Branch Sts. to old site Huasna Post Office, Huasna, $112,750, 3.75 mi. road from point opposite Southern Pacific Depot on County Rd. to Bridge St. at Grammar School corner, 20 ft. wide, $30,750, all crushed [illegible] with oil macadam; highway from 1st [illegible] 9th Sts. and from 20th St. to north limit [illegible] city, 20 ft. wide, El Paso de Robles, [illegible] plus funds to be expended [illegible] 9th St. to Morro, Cayucos-Cambria Rd., [illegible] ft. wide, Cayucos, $545,000, concrete [illegible] grading and graveling 14 mi. road [illegible] State Highway to west line Superv. [illegible] No. 5, 18-20 ft. wide, Templeton, $24[illegible]; grading graveling, improving [illegible] building Morro Rd. from State Highway [illegible] intersection to Atascadero Lake, Atascadero, west as far as funds permit, $25,000; rock macadam, 14 mi. road from Templeton east on Templeton-Creston Rd. No. 67 to east branch Templeton-Vasa Rd., etc., 16-[illegible] ft. wide, Creston, $16,000; grading and building highway and concrete culverts from Pozo over Pozo-San Juan Grades, 20 ft. wide, $85,000; improving 4800 ft. traffic way at intersection with State Highway, north, 24 ft. wide, Atascadero, rock macadam, $12,000. W. Burch, co. engr.

Ont., Hamilton—City plans to pave 2500 ft. road in cemetary, 18-24 ft. wide. Work involves 1700 sq.yd. waterbound macadam, 40,000 cu.yd. earth fill and a small concrete bridge. About $46,000.

Ont., Toronto—City Council plans to pave Swanwick Ave. from Main to Pichering Sts., asphalt, 24 ft. wide on 5 in. base, cost, $36,720; also curb, gutter and pave with asphalt, 28 ft. wide, on concrete base, from Main St. to city limits, $182,441; pave Edna Ave. from Indian Rd. to Indian Grove, bitulithic, $7520; Crown Park Rd., asphalt, $6609. R. C. Harris, City Hall, engr.

BIDS DESIRED

New Jersey—Until Jan. 7, by State Highway Comn., Broad St. Bank Bldg., Trenton, building 9702 sq.yd. State Highway Route No. 4, Sect. 3, Bway. to Scott Ave., South Amboy, Middlesex Co., concrete surface. W. G. Thompson, state highway engr.

Pa., Wilkes-Barre—Until Dec. 30, by F. H. Gates, city clk., repaving with sheet asphalt or asphalt paving blocks, also setting or resetting curbs in various streets.

W. Va., Franklin — Until Dec. 29, by Comrs. Pendleton Co., grading 4.17 mi. Franklin-Petersburg Rd., 26 ft. wide, involving 22,000 yd. excav. About $26,000. G. Boggs, co. clk.

W. Va., Williamson—Until Jan. 6, by E. Boggs, clk. Mingo Co., building portion Pigeon Creek, beginning at intersection of Rd. No. 4 (Williamson-Burch Rd.) with Rd. No. 10, at mouth of Little Buffalo Creek on Pigeon Creek, thence up Pigeon Creek to station 264, total length, 8 mi.; advertised in this issue.

Ga., Thomasville—Until Jan. 6, by Comrs. Thomas Co., building 2½ mi. Dixie Highway, involving 26,400 yd. paving and grading, 28.12 cu.yd. concrete, etc. About $85,000. F. Mitchell, Thomasville, engr. Noted May 15.

Ga., Valdosta—Until Jan. 16, by Comrs. Lowndes Co. building 4.86 mi. Natl. Highway from Valdosta to Mineola, 16 ft. wide, involving 45,940 sq.yd. paving, 8548 yd. excav., etc. About $150,000. Glyce & Hackley, 4th and 1st Bldg., Nashville, Tenn., engrs. Noted June 12.

Fla., Bunnell—Until Jan. 12, by Comrs. Flagler Co., hard surfacing with ojus rock, coquina rock or periwinkle shell, 26 mi. road in Shell Bluff Special Road Dist. About $150,000. S. C. Stattings, Bunnell, engr.

O., Cincinnati—Until Dec. 30, by city, grading, paving with bituminous macadam and building concrete curbs and gutters on 1630 ft. Rulison Ave., 30 ft. wide. About $21,231. F. Krug, city engr.

O., Cincinnati—Until Dec. 31, by city, paving with rein.-con. and building curbs and gutters on 690 ft. Gage St., 24 ft. wide. About $12,000. F. Krug, city engr.

Indiana—By Bd. Co. Comrs. building roads in following counties:

Dec. 29, Madison Co., Anderson, 2483 ft. concrete road, Anderson Twp., known as S. M. Mc Vay Rd., 6272 ft. road, Pipecreek and Duckcreek Twps., known as J. G. Lewis Rd.; 15,800 ft. in Anderson Twp., known as T. J. Nichol Rd. T. Flahavin, aud.

Dec. 31, Bartholomew Co., Columbus, 13,930 ft. crushed stone road, Hancock Twp., known as Fitzpatrick Rd. R. Henderson, aud.

Jan. 5, Ripley Co., Versailles, 10 mi. macadam road, Brown Twp., known as F. Moody et al Rd. J. F. Lockard, aud.

Newton Co., Kentland, macadam road, Beaver Twp., known as E. H. Kessler Rd. S. R. Sizelove, aud.

Blackford Co., Hartford City, crushed stone road, Jackson Twp., known as W. H. Brown Rd. W. C. Hughes, aud.

Streets and Roads (Continued)

Benton Co., Fowler, 15,830 ft. gravel road, Gilboa Twp., known as J. Burling Rd. W. Mankey, aud.

Warren Co., Williamsport, 4065 ft. gravel road, Steuben Twp., known as Lester Ping Rd. W. H. Stephens, aud.

Jaspar Co., Rensselaer, stone road, Walker Twp., known as J. Hine et al Rd. J. P. Hammond, aud.

Jan. 6. Harrison Co., Corydon, stone or gravel road between Posey and Taylor Twps., known as B. Russell et al Rd., 15,520 ft. stone road in Franklin Twp., known as J. Zabel Rd., road in Jackson Twp., known as J. Alitot Rd. S. C. Mauck, aud.

Noble Co., Albion, road in Washington Twp., known as N. S. Stump et al Rd. H. C. Erwin, aud.

Marshall Co., Plymouth, gravel road, Tippecanoe Twp., known as C. M. Urschel Rd., 3 roads in Bourbon Twp., known as A. C. Perry Rd., K. M. Bessinger et al Rd. and O. J. Senour et al Rd., road in Center Twp., known as J. R. Jacoby et al Rd.; road in Polk and West Twps., known as F. B. Haag et al Rd. O. H. Weber, aud.

Parke Co., Rockville, 6290 ft. gravel road, Penn Twp., known as Pierson et al Rd. R. E. Porter, aud.

Jan. 10, Floyd Co., New Albany, 30,180 ft. gravel road, known as Scottsville Rd. J. D. Mitchell, aud.

Jan. 20, Benton Co., Fowler, 15,830 ft. gravel road, Center Twp., known as M. Duffy Rd. W. Mankey, aud.

Allen Co., Ft. Wayne, 15,050 ft. stone road, Perry Twp., known as Hillegass Rd., 15,538 ft. road, Pleasant Twp., known as Smith Rd. A. C. Mc Coy, aud.

Michigan—Until Jan. 5, by F. F. Rogers, state highway engr., Lansing, grading, draining and surfacing 5.984 mi. State Trunk Line Rd., Assessment Dist. No. 127, 16 ft. wide, Ionia Co., involving 56,000 sq. yd. class B gravel. About $60,000.

Ia., Woodbine—City receiving bids for 51,500 yd. concrete pavement, 9000 yd. grading and 26,346 lin.ft. curb and gutters. About $150,000. Huff, Schmidt & Logan, Woodbine, engrs.

Kan., Leavenworth—Until Jan. 5, by Comrs. Leavenworth Co., grading 4.416 mi. Sect. C, Fort to Fort Highway, Federal Aid Project No. 13, 18 ft. wide, concrete, also necessary bridges and culverts on same. About $202,000.

Washington—Until Jan. 5, by J. Allen, state highway engr., Olympia, grading and draining 28 mi. Central Washington Highway from Connell to Lind, Adams and Frankin Counties; 8.6 mi. Inland Empire Highway, from Delaney to Dodge, Columbia and Garfield Counties.

Cal., Fresno—Until Jan. 13, by Bd. Supervs. Fresno Co., paving 10½ mi. road near Coalinga, concrete and asphalt or patented surface. D. M. Barnwell, co. clk.

Cal., San Bernardino—Until Jan. 5, by J. H. Osborne, city clk., paving 2 blocks 9th St., 4 in. concrete base and ½ in. oil and screenings surface. About $10,000. W. D. Brown, city engr.

Cal., Visalia—Until Jan. 6, by Bd. Supervs. Tulare Co., paving 6 mi. road from Poplar to Woodville, concrete. G. R. Prestidge, co. clk.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

N. Y., New York—M. F. Loughman, pres. Manhattan Boro., received bids Dec. 15, (a) paving with wood block in and between tracks roadway of Lexington Ave. from 53rd to 79th Sts., (b) with asphalt, Lexington Ave. to 97th St., from Asphalt Constr. Co., 2197 Madison Ave., (a) $83,178, (b) $74,652; J. L. Brustar, Harlem River and 150th St., (b) $76,697; Uvalde Asphalt Paving Co., 1 Bway., (b) $86,950.

★**N. Y., Rochester**—E. S. Walsh, supt. pub. wks., Capitol, Albany, let contract placing and compacting gravel surfacing and building frame freighthouse on terminal site here, Contr. 228, involving 150 cu.yd. excav., 45 cu.yd. 2nd class concrete, 4400 lb. iron castings, etc., to W. F. Martens, 245 Cutler Bldg., $13,493.

★**N. Y., Rochester**—Bd. Constr. & Supply let contract paving, building walks and sewers in Norton St. from Portland Ave. to Waring Rd., to J. Friedrichs Co., Livingston Bldg., $108,729.

★**N. Y., Rochester**—Bd. Contr. & Supply let contract resurfacing Driving Park Ave. and Tryon Park, asphalt, to Ribstein-Holter Co., 16 State St., $11,575 and $21,942 respectively.

Pennsylvania—State Highway Dept., Harrisburg, received bids building roads in counties as follows:

Allegheny Co., 10,453 ft. 1 course rein.-con., Forward Twp., from Foster-Waring Constr. Co., Pittsburgh, $136,081.

Armstrong Co., 10,610 ft. 1 course rein.-con., Kiskiminetas Twp., Summit Consir. Co., Akron, O., $119,883.

Beaver Co., 5443 ft. 1 course rein.-con., North Sewickley Twp., W. S. Morrison, New Brighton, $55,940; 13,592 ft. 1 course rein.-con. and Hillside vitr. brick, Daugherty and New Sewickley Twps., S. B. Markley, Rochester, $150,771, Foster-Waring Constr. Co., Pittsburgh, $155,595; 12,062 ft. 1 course rein.-con. and Hillside vitr. brick, Rochester and Daugherty Twps., S. Gamble Co., Carnegie, $180,921, J. C. Devine Co., Alliance O., $188,309, P. F. Connelly Co., Koppel, $196,562; 5311 ft. 1 course rein.-con., Center Twp., M. J. Scanlon, New Castle, $96,179, Jones Constr. Co., Lisbon Rd., Salem, O., $97,806.

Berks Co., 29,100 ft. 1 course rein.-con., Earl and Amity, Colebrookdale and Oley Twps., Weller Constr. Co., Inc., 816 14th St., Washington, D. C., $221,128, O'Rourke-Horton & Co., Reading, $223,723, Sutton & Corson Co., 9th and Simpson Sts., Ocean City, N. J., $244,895; 14,850 ft. 1 course rein.-con., Tilden and Upper Bern Twps., Bennett & Randall, Lebanon, $105,852, Sutton & Corson Co., 9th and Simpson Sts., Ocean City, N. J., $132,922.

Butler Co., 18,778 ft. 1 course rein.-con., Fairview Twp., M. J. Scanlon, Newcastle, $221,016; 31,663 ft. 1 course rein.-con., Conoquessing and Butler Twps., C. F. Walter, Butler, $316,042.

Carbon Co., 23,420 ft. 1 course rein.-con., Lehigh Twp., Morgan, Wilkes Barre, $232,-607.

Centre Co., 1720 ft. 1 course rein.-con., Bellefonte Boro., F. Murphy, Altoona, $38,-784, Spruks Co., Scranton, $45,248; 5326 ft. vitr. brick, State College Boro., L. E. Kelly, Brooklyn, N. Y., $154,878.

Chester Co., 11,524 ft. 1 course rein.-con., London Britain Twp., Winston & Co., Pottstown, $94,892, H. E. Baton, Front and Norris Sts., Phila., $99,282, M. Staub, Hammonton, N. J., $113,192.

Clearfield Co., 39,911 ft. 1 course rein.-con., Wallaceton Boro., Boggs and Bradford Twps., Warren Bros. Co., 142 Berkeley St., Boston, Mass., $415,451, Dowler & Anderson, Clearfield, $452,580, A. L. Anderson & Bros., Inc., Altoona Trust Bldg., Altoona, $501,776.

Delaware Co., 10,434 ft. 1 course rein.-con., Thronbury Twp., Sutton & Corson, 9th and Simpson Sts., Ocean City, N. J., $92,-829, Continental Contg. Co., 66 Knickerbocker Bldg., Baltimore, $95,759, M. Staub, Hammondton, N. J., $104,855.

Elk Co., 7543 ft. 1 course rein.-con., Ridgway Boro., Miller Constr. Co., Weber Bldg., Punxsutawney, $95,964; 3169 ft. 1 course rein.-con., St. Mary's Boro., C. A. McDonald, 26 South Franklin St., DuBois, $42,621, Fish, Young & Parks, Phila., $47,-262; 25,563 ft. 1 course rein.-con., Horton and Ridgway Twps., Warren Bros. Co., 142 Berkeley St., Boston, Mass., $285,721.

Erie Co., 10,600 ft. 1 course rein.-con., Mill Creek Twp., C. H. Fry Constr. Co., Erie, $70,527, H. Shenk Co., 12th and Sassafras Sts., Erie, $93,561; 21,268 ft. 1 course rein.-con., Girard Twp. and Platea, C. H. Fry Constr. Co., $164,270, H. Shenk Co., $183,780; 21,109 ft. 1 course rein.-con., Green Twp., Summit Constr. Co., Akron, O., $193,399.

Fayette Co., 1125 ft. 1 course rein.-con., Fayette City Boro., L. S. Schultz & Son, Fredonia, N. Y., $14,752, T. Arrigo, Charleroi, $14,755.

Petriello Bros. & Co., South Brownsville, $15,065; 5467 ft. 1 course rein.-con., Henry Clay Twp., Petriello Bros. & Co., $66,072; 3732 ft. 1 course rein.-con. and Hillside vitr. brick, German Twp., Petriello Bros. & Co., $54,106; 15,323 ft. 1 course rein.-con. and Hillside vitr. brick, Perry Twp., T. Arrigo, $161,608.

Greene Co., 12,581 ft. 1 course rein.-con., Center Twp., E. E. Morris and T. R. Huffman, Waynesburg, $201,604.

Lawrence Co., 14,784 ft. 1 course rein.-con., Scott Twp., Aronberg & McDonald, New Castle, $135,000, Burns Bros., New Castle, $136,677, M. J. Scanlon, New Castle, $154,209; 11,625 ft. 1 course rein.-con., North Beaver Twp., M. J. Scanlon, $124,-957, P. F. Connelly Co., Koppel, $127,691, Burns Bros., $134,484.

Montgomery Co., 8596 ft. bituminous surface on concrete foundation or 1 course rein.-con., Hatfield and Towamencin Twps., Fish-Rutherford, Inc., Phila., $73,008, Hill Constr. Co., Phila., $74,767, Warren Bros. Co., 142 Berkeley St., Boston, Mass., $78,-300.

Northampton Co., 18,860 ft. 1 course rein.-con., Palmer Twp., Smith-McCormick & McInerney & McNeal, Inc., Easton, $165,526, A. McMullen Co., Phila., $180,425, H. B. Sproul Constr. Co., Inc., Scranton, $212,750; 28,768 ft. 1 course rein.-con., Allen and East Allen Twps., A. McMullen Co., Phila., $231,883, Weller Constr. Co., 816 14th St., Wash., D. C., $234,812, Smith-McCormick & McInerney & McNeal, Inc., $248,777.

Northumberland Co., 17,569 ft. 1 course rein.-con., Ralpho Twp., Fiss & Christiano, Shamokin Dam, $171,631, Sutton & Corson Co., 9th and Simpson Sts., Ocean City, N. J., $172,284, Mason & Hanger Co., Inc., Paxinos, $173,709.

Potter Co., 8358 ft. bituminous surface course on concrete foundation, or 1 course rein.-con., Shinglehouse Boro., Chenango Constr. Co., Syracuse, N. Y., $89,894, Horn & Devling, Main St., Galeton, $90,766, G. Metzger, Jr., 12 East 4th St. Emporium, $99,021.

Somerset Co., 5900 ft. 1 course rein.-con., Jenner Twp., F. H. Ziegler, Somerset, $48,448, J. F. Norris, Somerset, $53,398, B. J. Lynch Co., Inc., Meyersdale, $54,077.

Susquehanna Co., 3844 ft. 1 course rein.-con. and Hillside vitr. brick, Oakland Boro., M. Barber, Binghamton, N. Y., $38,352, W. E. Bennett, Lanesboro, $45,788, O. B. S. Co., Phila., $59,619.

Tioga Co., 6382 ft. 1 course rein.-con., Westfield Boro., R. J. Delong, 764 West Edwin St., Williamsport, $78,017, J. C. Bradley & Co., Wellsboro, $80,037.

Warren Co., 2080 ft. 1 course rein.-con., Warren Boro., J. P. Morrissey, 309 Central Ave., Dunkirk, N. Y., $39,656.

Westmoreland Co., 9184 ft. 1 course rein.-con. and Hillside vitr. brick, Salem and Unity Twps., McCrady Bros. Co., Braddock, $138,195; 32,047 ft. 1 course rein.-con. and Hillside vitr. brick, Derry Twp., McCrady Bros. Co., $413,866, Langthorn Co., Inc., 2 West 45th St., New York City, $478,205; 57,549 ft. 1 course rein.-con. and Hillside vitr. brick, Delmont Boro., Hempfield, Salem and Washington Twps., Warren Bros. Co., 142 Berkeley St., Boston, Mass., $668,-986.

★**W. Va., Woodsdale (Wheeling P. O.)**—City let contract improving 14,295 ft. road, asphaltic concrete, 20 ft. wide, to Ball Eng. Co., Woodsdale, $92,000.

★**Fla., Jacksonville**—Comrs. Duval Co. let contract paving 6½ mi. Atlantic Blvd., to J. Y. Wilson Constr. Co., Clark Bldg. About $50,000.

★**O., Cleveland**—City let contract paving Adelbert Rd., to G. B. Herring, 10839 Drexel Ave., cost $7650; East 19th St., to Rieley Bros., The Arcade, $3875. Work involves 540 sq.yd. brick block, 2000 cu.yd. grading and 36,600 sq.yd. to be taken up and replaced with tar filler.

★**O., Hamilton**—City let contract grading and paving streets, building sidewalks, laying storm and sanitary pipe sewers, gas and water mains, in new addition to Welling & Franz, Cincinnatti. About $60,000.

★**O., Hamilton**—City let contract paving Webster and Sherman Ave. extensions, to Andrews Asphalt Paving Co., Rentschler Bldg., $69,224.

★**O., South Euclid**—Village let contracts for 13,000 cu.yd. grading on (1) Bayard Rd. and 4400 cu.yd. on (2) Wilmington Rd., to C. Wilms, Warrensville, $10,242 and $4477 respectively; 46,000 sq.ft. sidewalk on (1) and 25,000 sq.ft. on (2), both 2½ in. sandstone, to Cleveland Stone Co., 1836 Euclid Ave., Cleveland, $11,590 and $6420 respectively.

★**Mich., Marquette**—Rover Marquette Co. let contract clearing and grading 4.425 mi. Rd. No. 35-D, Marquette and Negaunee Twps., to Hall & Labby, Ironwood, $117,-500; clearing, grading and draining 9.007 mi. Rd. No. 35-E, to Garven-Wavenberg, Appelton, Wis., $160,000.

★**Minn., Duluth**—W. H. Borgen, aud. St. Louis Co., let contracts to S. J. Groves & Sons Co., 105 Kasota Bldg., Minneapolis, for subgrade construction on State Rd. No. 1 as follows: 10 mi. Div. No. 1 and 15 mi. Div. No. 2, State Job No. 1903, cost $124,130 and $221,085 respectively; 9.3 mi. State Job No. 1904, $162,192, all without special excavation and rock piled in grubbing.

★**Mo., Lancaster**—Town let contract paving Main St., involving 14,000 sq.yd. vitr. brick, 7500 ft. concrete curb and 3500 cu.yd. earth excav., to Cameron, Joyce & Co., Keokuk, Ia. About $55,000.

★**Okla., Okmulgee**—City let contract for 175,000 yd. concrete pavement, to Park-Moran Co., Okmulgee, Dist. No. 31, $97,183; Dist. No. 32, $12,729; Dist. No. 38, $25,693; Dist. No. 39, $54,720, and Dist. No. 40, $161,882. About $350,000.

★**Ariz., Clifton**—Comrs. Greenlee Co. let contract building Sects. 1 and 2 Clifton-Franklin Highway, Federal Aid Project No. 13, involving 32,000 cu.yd. road, 5000 cu.yd. borrow and 25,000 cu.yd. unclassified excav., 2630 cu.yd. class A concrete in bridges, 634 cu.yd. class B concrete, 2426 cu.yd. excav. for bridges and 84,707 lb. reinforcing steel, etc., to Webster, Webster & Kerby, Clifton, $111,213.

Streets and Roads (Continued)

Ore., Seaside—City Council received only bid grading, draining and paving with concrete, building concrete curbs and sidewalks on 11 streets, from J. H. Tillman, Hammond. About $200,000.

★**Cal., Los Angeles**—Los Angles Co. let contract to Rogers Bros. Co., 350 Merrick St., $65,582, improving 2.4 mi. Harbor Truck Blvd., near Compton, 24 ft. wide and shoulders, involving 500 cu.yd. excav., 12,802 lin.ft. shaping roadbed. 7820 tons placing disintegrated granite, 34,136 sq.yd. 8 in. concrete paving, 22 cu.yd. concrete culverts and 4610 lb. reinforcing steel. County furnishes 7820 tons disintegrated granite, 11,481 bbl. cement and 316,266 sq. ft. weld wire mesh.

Cal., San Francisco—City received bids improving London St. between France and Amazon Aves., involving 2270 lin. ft. concrete curbing, 17,450 sq ft. artificial sidewalks, 5428 cu.yd. earth excav., 1000 sq. yd. vertical fibre, 3162 sq.yd. asphalt, etc., from Flinn & Treacy, 1 Montgomery St., $35,540; Reisch Impvt. Co., 46 Kearny St., $36,818. Former bids rejected.

★**Ont., London**—City will pave 24 mi. various streets. About $640,000. Work will be done by day labor under supervision of H. A. Brazier, city engr.

★**Ont., Toronto**—Bd. Control let contracts to Toronto Comr. of Wks., City Hall, Building asphalt pavements on Bristol Ave., $9908, Herman Ave. $3379, Hiawatha Rd. $13,926, Sackville St. $11,257; granite block pavement on Eastern Ave. from St. Lawrence St. to Broadview Ave. $37,440.

★**Ont., Toronto**—Bd. Control let contract to Godson Contg. Co., Manning Chambers, building asphalt pavements on Kennelworth Ave., $3157, Alven Ave. from Heath St., E., to Glen Elm Ave., $4959, Don Crest Rd. from 3rd St. to Ozark Crescent $7661, Weston Rd. $3481; Ramsey Contg. Co., 39 Indian Rd., concrete sidewalk, Erie Terrace from Queen to Gerard Sts., $2.23 per lin. ft., total $4000; Warren Bituminous Paving Co., McKinnon Bldg., bitulithic pavement on Exeter Ave. from Laughton to East End, $5871.

★**Ont., Toronto**—City Council let contract to Godson Constg. Co., Manning Chambers, building asphalt pavements on Greenwood Ave., $4296, Furness Ave., $6200, concrete curbing on Strathmore Blvd., $.80 lin.ft., to Comr. of Wks., City Hall, concrete sidewalks on Bay St. $.34 sq.ft., asphalt pavements on Bathgate Ave., $8488, Baltic Ave., $5604, Linsmore Crescent, $10,385 and Strathmore Blvd., $8351. Noted July 10.

Railways

PROPOSED WORK

Ont., Hanover—See "Industrial Works."

BIDS DESIRED

Ontario—Until Jan. 3, by City of Toronto, building 3 mi. double track railway from Toronto to Mount Pleasant, involving earth excav., fill, ballast and 6 mi. transmission line. About $750,000. R. C. Harris, City Hall, Toronto, engr. Noted Aug. 21.

Excavation and Dredging

PROPOSED WORK

Miss., Cleveland—Excavation—Drainage Comrs. Lead Bayou D.D. Bolivar Co. soon lets contract for excavating following ditches: Horseshoe Bayou, 16,000 ft. long, involving 105,380 cu.yd. excav. and 51.40 acres clearing of right of way; East Main, 17,800 ft. long, 77,892 cu.yd. excav., and 62 acres clearing; East Main, 13,000 ft. long, 62,908 cu.yd. excav.; Lateral No. 9, 1700 ft. long, 5290 cu.yd. excav. and 3.5 acres clearing; Lateral No. 3, 4000 ft. long, 9190 cu.yd. excav. and 3 acres clearing; Lateral No. 5, 5500 ft. long, 3700 cu.yd. excav.; West Main, 36,100 ft. long, 151,000 cu.yd. excav. and 101.1 acres clearing; West Main, 13,700 ft. long, 101,900 cu.yd. excav.; Lateral No. 1, 9800 ft. long, 49,728 cu.yd. excav. and 20 acres clearing; Lateral No. 2, 3700 ft. long, 21,074 cu.yd. excav. and 8 acres clearing; Lateral No. 7, 5500 ft. long, 15,860 cu.yd. excav. and 11 acres clearing; Lateral No. 8, 3000 ft. long, 9330 cu.yd. excav. and 6 acres clearing; South Main, 12,600 ft. long, 63,200 cu.yd. excav. and 45 acres clearing; South Main, 9200 ft. long, 43,480 cu.yd. excav.; Lateral No. 6, 14,500 ft. long, 81,000 cu.yd. excav. and 30 acres clearing. W. W. Boone, engr.

Tenn., Memphis — Irrigation — Big Creek D. D. having surveys made of 12,000 acres north of Memphis preparatory to reclamation. About $150,00. Gaines & Carlisle, Memphis, engrs.

Minn., Elk River—Ditch—Comrs. Sherbourne Co. receive bids about February, building D. D. No. 27, involving 13,229 cu. yd. dirt excav., laying 3944 ft. 8-18 in. sewer pipe, head walls, culverts, etc. About $27,000. Former bids withdrawn. F. W. Nickerson, Elk River, engr.

Mont., Laurel — Ditch — Cove Ditch Co. plans to enlarge ditch, to irrigate 65,000 acres. About $200,000. B. C. Lillis, engr.

Mo., Bigelow—Drainage—Bd. Supervs. Squaw Creek D. D., Holt Co., have asked engineers to submit on or before Jan. 15, complete and comprehensive plans for reclamation of said district, comprising 29,000 acres of land. F. Walker ,Bigelow, secy. bd. supervs.

Washington—Special commission appointed by State of Washington with I. E. Goodner, state office engr., Salem, making preliminary surveys and plans for diverting water from Pend Oreille River for irrigation of 2,000,000 acres in big bend of Snake and Columbia Rivers.

Ore., Grants Pass—Ditch, etc.—H. J. Sisty and J. N. Britten filed application with P. A. Cupper, state engr., Salem, for appropriating 50 second ft. of water from Soldier Creek for placing mining and building ditch, headgate and dam. About $12,000.

Cal., Grass Valley—Irrigation—State will make preliminary investigatoins to determine possibilities for irrigation from Yuba River watershed, of large area in Nevada and Yuba Counties. W. F. McClure, Forum Bldg., Sacramento, state engr.

Cal., Westpoint—Canal—See "Industrial Works."

BIDS DESIRED

N. J., Jersey City—Excavating—Until Dec. 30, by F. A. Dolan, city clk., for rock excavation and removal of same in water pipe trench, Webster Ave. from North St. to Paterson Plankroad.

Ill., Shawneetown—Drainage—Until Jan. 6, by Comrs. Rocky Branch D. D., Gallatin Co., cutting ditches, laying tile drains, and building concrete spillway or retaining bottom, involving 105,239 cu.yd. excav. and 498 rods 12-18 in. tile. R. J. Mills, comr.

Ia., Charles City—Irrigation—Until Dec. 30, by Comrs. Floyd Co., furnishing labor and materials for building D.D. No. 9. Work involves 1500 ft. open ditch, 1 concrete bulkhead, 26 intakes and laying 112,623 ft. 6-36 in. tile. C. R. Jones, aud.

Ia., Charles City—Irrigation—Until Dec. 30, by Comrs. Floyd Co., furnishing labor and material for building D. D. No. 10. Work involves 19 manholes, 32 intakes, 1 bulkhead and laying 20,424 ft. 8-36 in. No. 2 vitr. pipe sewer. C. R. Jones, aud.

Ia., Des Moines—Drainage—Until Jan. 5, by F. J. Alber, aud. Polk Co., building D.D. No. 25. Project consists of widening, straightening and deepening 14 mi. Skunk River across northeastern part of county involving 1,151,360 cu.yd. earth excav. for channel, building levees, etc.

Ia., Sidney—Ditch—Until Jan. 15, by H. C. Swanson, aud. Fremont Co., building East Nishnabotna Ditch No. 4, with Laterals A and B, main ditch, 10.64 mi. long, 24 ft. wide, involving 836,000 cu.yd. earth excav., Lateral A, 3900 ft. long, 4 ft. wide, 6000 cu.yd. earth excav., Lateral B, 6500 ft. long, 4 ft. wide, 7000 cu.yd. earth excav.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

★**O., Ashtabula**—Excavation—City Council let contract excavating new spray pond in connection with municipal lighting plant, to E. J. Inman, $18,806.

Industrial Works

Mass., Springfield—See "Buildings."

Mass., Woburn—Crescent Leather Co. having plans prepared by Vaughn & Meyer, archts. and engrs., Security Bldg., Milwaukee, Wis., for two 3 story, 50 x 240 ft. brick and mill construction, tanneries, brick foundation. About $175,000.

Mass., Worcester—See "Buildings."

Mass., Worcester—Olson Mfg. Co., 54 Commercial St., plans to build factory on Barber and Wiley Aves. Architect not selected.

Mass., Worcester—J. Rice, archt., 306 Main St., receives bids about Jan. 10, building 1 story, 160 x 186 ft., concrete service station and salesroom, concrete flooring and foundation, for Franklin Motor Car Co., 3 King St. About $70,000.

Mass., Worcester—Sanford Riley Stoker Co., 25 Foster St., plans to build 1 story, 30,000 sq. ft., brick and concrete plant, concrete flooring and foundation, on West Boylston St. About $60,000. Private plans.

Conn., Hartford—See "Buildings."

Conn., Naugatuck—Lockwood, Green Co., archts. and engrs., 101 Park Ave., New York City, receive bids about Jan. 10, building 4 story, 60 x 80 ft., brick and steel factory, rein.-con. flooring, concrete foundation, for Naugatuck Chemical Co., c/o architects. About $100,000.

Conn., New Haven—Lockwood, Green Co., archts. and engrs., 101 Park Ave., New York City, receive bids about Jan. 10, building 3 story, 80 x 100 ft., brick, rein.-con. and steel factory, rein.-con. flooring, concrete foundation, for A. C. Gilbert, c/o architects. About $80,000.

Conn., Thomaston—Seth Thomas Clock Co., c/o Lockwood-Green Co., archts. and engrs., 101 Park Ave., New York City, soon receives bids building 2 story, 60 x 120 ft., and 4 story, 60 x 120 ft., rein.-con. and steel factories, rein.-con. flooring, concrete foundation.

N. Y., Brooklyn—F. Huber, 314 Park Ave., having plans prepared by W. B. Wills, Inc., archts. and engrs., 1101 Myrtle Ave., for 2½ story, 100 x 100 ft., brick and steel storage plant, rein.-con. flooring, concrete foundation, on Grand Ave. About $50,000.

N. Y., Brooklyn—Hudson Bag Co., 77 Washington St., receives bids about Dec 29, building 2 story, 200 x 265 ft., brick and steel factory and warehouse, rein.-con. flooring, concrete foundation, on Rogers, Scholes and Meserole Sts. About $130,000. L. Allmendinger, 20 Palmetto St., archt. and engr.

N. Y., Brooklyn—L. Allmendinger, archt. and engr., 20 Palmetto St., receives bids about Jan. 2, building 1 and 2 story, 75 x 217 ft., brick and steel plant, rein.-con. flooring, concrete foundation, on Flushing Ave., for Kirsch & Hersel, 214 Scholes St. About $30,000.

N. Y., Brooklyn (Bay Ridge)—Knickerbocker Ice Co., 1480 Bway., New York City, soon lets contract building 1 story, 70 x 100 ft., rein.-con. and steel plant, rein.-con. flooring, concrete foundation. About $50,000.

N. Y., Lockport—Bd. Supervs. Niagara Co. plans to establish stone crushing plant at old poor house farm. About $25,000. Address J. W. Turner, Jr., 80 East Ave.

N. Y., Long Island City—J. Clark, c/o B. R. Swartburg, archt. and engr., 103 Park Ave., New York City, having plans prepared for 8 story, 100 x 150 ft., rein.-con. and steel factory, rein.-con. flooring, concrete foundation. About $380,000.

N. Y., Long Island City—B. J. Johnson Soap Co., c/o Lockwood-Green Co., archts. and engrs., 101 Park Ave., New York City, having plans prepared for 4 story, rein.-con. and steel warehouse, rein.-con flooring, concrete foundation. About $250,000.

N. Y., Massena—J. Dunlop Sons Co., 19 Madison Ave., New York City, plans to alter and build additions to 2 plants on East Orms St., here. Cost, including machinery, $100,000. A. L. Brockway, 3rd Natl. Bank Bldg., Syracuse, archt.

N. Y., Mount Morris—Perry Knitting Co. purchased Seymour Opera House and plans to alter, build additions and install machinery in same for its own use. About $100,000. F. C. Miller, mgr.

N. Y., New York—L. Schurmacher, 1128 Bway., having plans prepared by L. A. Sheinart, archt. and engr., 192 Bowery, for 2 story, 75 x 130 ft., brick and steel garage, rein.-con. flooring, concrete foundation, at 1124 1st Ave. About $25,000.

N. Y., Rochester—Natl. Fire Escape Corp. recently incorporated with $250,000 capital stock plans to build modern assembly plant. About $150,000. Address G. Y. Webster, Wilder Bldg.

N. Y., Syracuse—Battery Serv. Co., Inc., 562 East Genesee St., receives bids about Mar. 1, building 1 story, concrete and steel factory. About $50,000. M. E. Granger, Gurney Bldg., archt. and engr.

N. Y., Syracuse—C. G. Hanna Co., South Clinton St., plans to build 4 story, 132 x 133 ft., concrete and steel factory, rein.-con. flooring, concrete foundation, on East Genesee St. About $165,000. Architect not selected.

N. J., Harrison—Lockwood, Green & Co., archts., 101 Park Ave., New York City, receive bids about Jan. 7, building 3 story, 50 x 100 ft., rein.-con. and steel extension to shipping and factory buildings, for Driver-Harris, Middlesex St.

N. J., Harrison—Lockwood, Green & Co., archts., 101 Park Ave., New York City, receive bids about Jan. 5, building 6 story, 80 x 200 ft., rein.-con. and steel factory, rein.-con. flooring, concrete foundation, for Driver-Harris, Middlesex St.

Industrial Works (Continued)

Pa., Scranton—Klots Throwing Co., c/o Lockwood, Green & Co., archts., 101 Park Ave., New York City, receives bids about Jan. 5, building 2 story, 116 x 200 ft., rein.-con. and steel factory, rein.-con. flooring, concrete foundation, here.

Md., Baltimore—L. Miller, 5 Lloyd St., receives bids about Jan. 15, building 2 story, 45 x 50 ft., dairy and cold storage plant, concrete and brick, concrete foundation, at 5-7-9 Lloyd St. About $50,000. G. B. Callis, Melvin Ave., Catonsville, archt.

Va., Petersburg—Steward Trunk & Bag Co. and F. A. Bishop, archt., Petersburg, soon receive bids building 2 story, 30 x 85 ft., concrete and brick factory, rein.-con. flooring, concrete foundation, on High St. About $25,000.

N. C., Greensboro—J. E. Sirrine, engr., Greenville, S. C., soon lets contract building 1 story, 60 x 110 ft., brick and timber addition to mill, for Pomona Mills, Greensboro.

S. C., Bamberg—J. E. Sirrine, engr., Greenville, soon lets contract building 2 story, 52 x 375 ft., brick and timber addition to cotton mill, for Bamberg Cotton Mills.

S. C., Orangeburg—J. E. Sirrine, engr., Greenville, soon lets contract building 1 story, 65 x 90 ft. mill construction warehouse, cement concrete flooring for Santee Mills.

O., Bucyrus—Halliday Motors Co. purchased site and plans to build factory covering 40,000 sq.ft. floor space. T. E. Huth, pres.

O., Cincinnati—E. H. Bardes Range Co., Colerain and Alfred Sts., plans to build 2 story, 85 x 102 ft., rein.-con. pattern shop. Kruckemeyer & Strong, St. Paul Bldg., archts.

O., Cleveland—Bender Auto Co. soon lets contract building 1 story, 100 x 250 ft., concrete, steel and brick factory, rein.-con. flooring, concrete and brick foundation, on West 65th St. and Denison Ave. About $150,000. Address H. Bender, c/o Northern Blower Co., Barberton Ave. R. M. Hulett, Fire Bldg., archt.

O., Cleveland—M. Hinkel, pres. Hinkel Motor Truck Corp., 6521 Euclid Ave., plans to build 2 story, 180 x 200 ft., concrete, steel and brick garage and salesroom, rein.-con. flooring, concrete foundation, on East 71st St. and Carnegie Ave. About $100,000. Whitworth & Johnson, Engineer's Bldg., archts.

O., Dayton—Allsteel Ridewell Tire & Rubber Co., Dayton Savings & Trust Bldg., plans to build 3 story, rein.-con. factory, rein.-con. flooring, concrete foundation. About $100,000. Architect not selected.

O., Dayton—Dayton Pneumatic Tool Co., Chapel Rd., plans to build 2 story, 100 x 100 ft., rein.-con. and brick addition to factory, rein.-con. flooring, concrete foundation. About $75,000. Architect not selected.

O., West Barberton—Portage Rubber Co. having plans prepared and soon receives bids constructing power plant and office building. About $200,000.

Ind., Indianapolis—Van Briggle Chemical Co., 429 North Capitol Ave., plans to build 3 story, 160 x 200 ft., rein.-con. and terra cotta factory, concrete foundation, on 16th St. and Capitol Ave. About $125,000. C. E. Bacon, Merchants' Bank Bldg., archt.

Mich., Detroit—Clayton & Lambert Mfg. Co., Beaubien St., plans to build power plant, also 1 and 2 story, rein.-con., brick and steel factory, rein.-con. flooring, concrete foundation, along tracks of Detroit Terminal Ry. About $500,000.

Mich., Detroit—Columbia Motors Corp., 1256 East Jefferson Ave., having plans prepared by H. H. Lane, engr. and archt., Dime Bank Bldg., for 2 and 3 story, 300 x 720 ft., rein.-con. and brick, rein.-con. flooring, concrete foundation, on Fort and Boyd Sts. About $600,000. Noted June 19.

Mich., Grand Rapids—Sonneveld Bros., 815 Leonard St., N. W., having plans prepared by P. Lindhout, archt., 817 Lake Drive, for 2 story, rein.-con., brick and steel addition to bakery and storage building, rein.-con. flooring, brick foundation. About $40,000.

Mich., Muskegon—See "Miscellaneous."

Ill., Chicago—Illinois Glass Co., Alton, acquired 157,462 sq.ft. of land on North Crawford and Wrightwood Aves. and plans to build plant. About $250,000.

Ill., Jacksonville—City plans to build additions to steam power plant. About $40,000. C. M. Borchers, mayor.

Wis., Marinette—Amer. Toy Horse Co. plans to build two 1 or 2 story, 100 x 200 ft. rein.-con. and brick factories, rein.-con. flooring, on Water St. About $150,000. H. Greene, 425 East Water St., Milwaukee, pres. Architect not selected.

Wis., Milwaukee—M. Tullgren & Sons, archts., 425 East Water St., soon let contract building 2 story, 60 x 100 ft., rein.-con. and brick factory, rein.-con. flooring, concrete foundation, for Genl. Mfg. Corp., 1520 Buffum St. About $50,000.

Wis., Racine — Racine Confectioners' Mchy. Co., 1630 Racine St., having plans prepared by D. R. Davis, archt. and engr., 526 Wisconsin St., for 1 story, 38 x 120 ft. machine shop and 2 story, 50 x 165 ft. factory, brick and concrete, rein.-con. flooring. About $60,000.

Wis., Waukesha — Bethesda Mineral Spring Co., 301 Dunbar Ave., plans to build 1 or 2 story, 40 x 60 ft., rein.-con. and brick plant, rein.-con. flooring, concrete foundation. About $25,000. Van Ryn & De Gelleke, Caswell Blk., Milwaukee, archts. and engrs.

Minn., Duluth—Minnesota Steel Co., Wolvin Bldg., having plans prepared and receives bids about spring extending blast furnace plant, here. Work involves building 175 concrete block houses at Morgan Park, (company's model town for housing employes), cost $2,000,000; rod and wire mills, cost $3,000,000, including conversion of rail mill into billet mill, now under construction by day labor. Project also includes 3 additional blast furnaces, 14 open-hearth furnaces and a unit of 16 soaking pit furnaces, cost $10,000,000.

Minn., Minneapolis—Berger Mfg. Co., 300 10th Ave., S., having plans prepared by W. C. Westbey, archt., c/o owner, for 1 story, 80 x 112 ft., timber addition to factory, on Ulysses St. and Bway., N. E. About $60,000.

Minn., Minneapolis — Harris Realty Co., New England Bldg., having revised plans prepared by C. L. Kinport, archt., Andrus Bldg., for 2 story, 100 x 120 ft., rein.-con. and brick garage, on Lincoln and Aldrich Aves., S. About $52,000. Former bids rejected.

Wash., Olympia—Olympia Door Co. plans to build 2 story frame factory, concrete foundation, 150,000 ft. daily capacity, adjoining present plant. About $25,000. Private plans.

Wash., Sedro Wooley—T. Jungmeyer plans to build 1 story, 40 x 90 ft., brick garage, concrete foundation. About $50,000. Private plans.

Wash., Spokane—Centennial Mills, Ltd., 817 Howard St., plans to build 8 story mill with 27 rein.-con. tanks, 1,000,000 bu. capacity, and 7 story warehouse, 250,000 bu. capacity; both rein.-con., rein.-con. flooring. About $1,000,000. A. E. Witherspoon, Spokane, engr.

Ore., Doris (Ranier P. O.)—Associated Lumber & Box Co., Klamath Falls, plans to build 1 story frame factory, concrete foundation, here (25,000,000 ft. yearly capacity). About $25,000. Private plans.

Ore., Portland—Montgomery Ward & Co., 581 Upshur St., plans to build 8 story, 280 x 600 ft., mail order house, 1st unit, 280 x 300 ft., at Guilds Lake Dist. About $1,500,000. W. Q. Bateman, local mgr. W. H. McCaully, 2701 Mildred Ave., Chicago, engr.

Ore., Salem—Puyallup & Sumner Co. plans to build 2 story frame and concrete cannery, concrete foundation, in suburbs. About $50,000. Architect not selected.

Cal., Emeryville—W. J. Miller, archt., 417 Market St., San Francisco, soon receives bids building 2 story, brick factory, concrete foundation, for Amer. Rubber Co., Emeryville. About $100,000.

Cal., Westpoint—Mokelumne River Power & Water Co., San Mateo, plans to build one 6000 h.p. and 12,750 h.p. hydro-electric plants, 2 diversion canals, 4½ and 5½ mi. long, loose rock and concrete dam and reservoirs in south, middle and north forks of Mokelumne River. About $1,288,500.

Que., St. Hyacinthe—E. H. Richer plans to build 4 story, 175 x 225 ft., steel and brick factory, concrete foundation, on Ioli St. About $200,000. Architect not selected.

Que., St. Jerome—Regent Knitting Co., Ltd., Duluth and St. Lawrence Sts., Montreal, soon lets contract building 2 story, 50 x 75 ft., concrete and brick factory, rein.-con. flooring, on Notre Dame St. About $85,000.

Ont., Hanover—Hanover Portland Cement Co. plans to build quarry plant and 7 mi. light railway from present plant to quarry. About $200,000.

Ont., St. Thomas — Watt & Blackwell, archts., Bank of Toronto, London, preparing plans and receive bids about Jan. 5, building 3 story, 40 x 125 ft., rein.-con. plant, here, for Aylmer Laundry Co., Aylmer. About $75,000.

Ont., Toronto—Auto Serv. Co., 139 Pears Ave., having plans prepared by Banigan & Thompson, archts. and engrs., 7 King St., E., for 6 story, brick and concrete garage, rein.-con. flooring, concrete foundation, on Richmond St. About $600,000.

Ont., Woodstock—Brunswick Canadian Products Co. plans to build concrete, steel and brick factory, rein.-con. flooring, concrete foundation. About $200,000. Architect not appointed.

BIDS DESIRED

N. Y., Brooklyn—Until Jan. 2, by Zipkes, Wolff & Kudroff, archts. and engrs. 25 West 42nd St., New York City, building 2 story, 100 x 125 ft., brick and steel warehouse, rein.-con. flooring, concrete foundation, on North Portland Ave., for H. De Angelis, 4-6 Park Ave. About $75,000. Noted July 10.

N. J., Newark—Until Dec. 30, by W. Steele & Sons Co., archts., 16th and Arch Sts., Phila., building 1½ story, 121 x 250 ft., rein.-con. factory, for Morris Twine Co.

O., Cleveland—Until Dec. 29, by W. J. Carter, engr., Illuminating Bldg., constructing 60 x 120 ft. factory, concrete foundation, at 1787 40th St., cost $60,000, 55 x 160 ft., factory, brick foundation, at 4415 Perkins Ave., $75,000, 60 x 160 ft. warehouse, concrete foundation, at 4400 Hough Ave., $60,000, all 3 story, steel and brick, for Amer. Stove Co.

O., Cleveland—Until Dec. 29, by W. S. Lougee, archt., Marshall Bldg., constructing 4 story, 100 x 110 ft., steel and brick factory, brick foundation, on Barberton Ave., for Colonial Woolen Mills Co., 6409 Barberton Ave. About $80,000. J. N. Hahn, pres.

O., Sidney—Sidney Mfg. Co., East Ave., receiving bids building 3 story, 30 x 82 ft., steel and brick factory, rein.-con. flooring, brick foundation, on Clinton St. About $50,000. United States Structural Co., City Natl. Bank Bldg., Dayton, archts.

Ill., Chicago—W. G. Uffendel, archt., 39 South State St., receiving bids constructing plant, including 2 story, 125 x 190 ft. main building, 2 story, 47 x 95 ft. office building, and 1 story, 47 x 66 ft. boiler house and garage with 1 story wing, all rein.-con. and brick, rein.-con. flooring, concrete foundation, at 2701 Greenview Ave., for Economy Fuse & Mfg. Co., 328 West Kinzie St. About $150,000.

Ill., Chicago—Mutual Broom Co., 1505 South Halstead St., receiving bids building 2 story, 100 x 125 ft., brick and timber factory, concrete foundation, on Ogden Ave. and Polk St. About $60,000. A. L. Himelblau, 179 West Washington St., archt.

Utah, Salt Lake City—Until Jan. 10, by Salt Lake Stamp Co., 65 West Bway., building 2 story, 35 x 110 ft., rein.-con. factory, on 3rd S. and 1st W. Sts. About $50,000. Gunther & Cannon, Deseret Bank Bldg., archts.

Wash., Pullman—Until Jan. 7, by T. C. Martin, building 2 story, 120 x 120 ft., brick and terra cotta garage and shop, on Grand and Oleson Sts. About $40,000. W. Swain, Pullman, archt.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

★**Mass., Brookline** (Boston P. O.)—See "Buildings."

★**Mass., Cambridge**—Cambridge Terminal Co. let contract building 9 story, concrete warehouse, to F.T. Ley Co., 185 Devonshire St., Boston. About $5,000,000.

★**Mass., Everett** (Boston P. O.)—Everett Factories Corp., 210 Bway., let contract building 4 story, brick and steel plant, concrete foundation, on Charleton St., to Clark & Lee Co., 201 Devonshire St., Boston. About $60,000.

★**Mass., New Bedford**—W. Whitman Co., 78 Chauncey St., Boston, let contract building brick and rein.-con. mill, picker house, storehouse and office, rein.-con. flooring, to L. E. Locke Constr. Co., Bay State Bldg., Lawrence. About $1,500,000.

★**Mass., Norfolk Downs** (Boston P. O.)—Pneumatic Scales Co. let contract building 3 story, 150 x 160 ft., brick and concrete addition to plant, to Aberthaw Constr. Co., School St., Boston.

★**Mass., Roxbury** (Boston P. O.)—Miller Candy Co., 116 North St., Boston, let contract altering 4 story, brick building, on Heath and Parker Sts., here, to C. A. Dodge Co., Erie St., Cambridge. About $100,000.

★**R. I., Woonsocket**—Woonsocket Wagon Mfg. Co., 15 Worrall St., will build a 2 story, 75 x 200 ft., concrete and steel factory, rock foundation, at 12 Worrall St. About $100,000. Work will be done by day labor.

Industrial Works (Continued)

★**Conn., Hartford**—Hartford Fairmont Co., 41 Arch St., let contract building 1 and 2 story, 93 x 194 ft., brick and concrete addition to plant, concrete flooring and foundation, to Bent-Bartlett Co., 43 Ann St.

★**Conn., Waterville** (Waterbury P. O.)—Amer. Pin Co. let contract building 4 story, 50 x 204 ft., brick and mill construction addition to factory, concrete foundation, to Torrington Bldg. Co., 197 Water St., Torrington. About $200,000.

★**N. Y., Attica**—Merrill-Soule Co., North Franklin and Plum Sts., Syracuse, let contract building 3 story, 45 x 74 ft. factory, here, to Turner Constr. Co., 244 Madison Ave., New York City.

★**N. Y., Brooklyn**—J. Crawford, 753 Flatbush Ave., will build 1 story, 100 x 190 ft., brick and steel garage, rein.-con. flooring, concrete foundation, on Church Ave. and Johnson Pl. About $30,000. Work will be done by day labor.

★**N. Y., Brooklyn**—M. Friedland, c/o P. Caplan, archt., 16 Court St., will build 1 story, 100 x 150 ft., brick and steel garage, rein.-con. flooring, concrete foundation, on 36th St. About $35,000. Work will be done by day labor.

★**N. Y., Brooklyn**—Sarkus Bros., Inc., 287 Thatford Ave., will build 1 story, 70 x 80 ft., brick and steel factory, rein.-con. flooring, concrete foundation, at 534 Junius St. About $25,000. Work will be done by day labor.

★**N. Y., Brooklyn**—J. Sclecowitz, 503 Myrtle Ave., will build 1 story, 100 x 100 ft., brick and steel garage, rein.-con. flooring, concrete foundation, on Fulton St. and Hopkinson Ave. About $30,000. Work will be done by day labor.

N. Y., Brooklyn—State Hospital Comn., Capitol, Albany, received bids building 2 story, 50 x 71 ft., brick and steel addition to laundry, concrete foundation, for Brooklyn State Hospital, here, general contract, from E. D. Broderick, 110 West 40th St., New York City, $40,800 (200 working days), McCann Bldg. Co., Dove St. and Sheridan Ave., Albany, $47,653 (200 working days), Fox, Reynolds Co., Inc., 81 East 125th St., New York City, $59,600 (200 working days); plumbing, from W. B. Armstrong Co., 3 Fulton St., Albany, $6288, C. H. Darmstadt, Inc., 852 West 43rd St., New York City, $6995; equipment, from Amer. Laundry Mchy. Co., 134 West 37th St., New York City, Proposal No. 1, $11,441, Proposal No. 2, $31,283, Henrici Laundry Mchy. Co., 46 Dey St., New York City, Proposal No. 1, $12,145, Troy Laundry Mchy. Co., 133 Centre St., New York City, Proposal No. 1, $14,400, Proposal No. 2, $32,455.

★**N. Y., Delevan** — Merrell-Soule Co., North Franklin and Plum Sts., Syracuse, let contract building 2 story, 60 x 100 ft., factory with 31 x 60 ft. boiler room extension, here, to Turner Constr. Co., 244 Madison Ave., New York City.

★**N. Y., Jamaica**—Agro Constr. Co., Hillside Ave., will build 1 story, 50 x 100 ft., brick and steel factory, rein.-con. flooring, concrete foundation, on Fulton St. About $80,000. Work will be done by day labor.

★**N. Y., Long Island City**—Transport Service Co., 125 Harris Ave., let contract, building 5 story, 75 x 100 ft., brick and steel garage and service station, rein.-con. flooring, concrete foundation, to L. Gold, 44 Court St., Brooklyn. About $200,000.

★**N. Y., North Tonawanda**—Buffalo Sled Co., 107 Woodward Ave., Buffalo, let contract building 2 story, 80 x 360 ft. and 1 story, 80 x 140 ft., rein.-con. factory, here, to W. Steele & Sons Co., 16th and Arch Sts., Phila., Pa.

★**N. Y., Port Jervis**—S. J. Sonnenburg, 220 Straight St., Paterson, N. J., let contract building 1 story, 50 x 200 ft., brick and steel mill, rein.-con. flooring, concrete foundation here, to O. W. Shelly, 1 West 34th St., New York City. About $30,000.

★**N. J., Asbury Park**—Rydon Tire & Rubber Co., c/o E. A. Arend, archt., 105 West 40th St., New York City, let contract building brick and steel factory, rein.-con. flooring, concrete foundation, here, to Amer. Concrete Steel Co., 27 Clinton St., Newark. About $100,000.

★**Ala., Gadsden**—Gulf States Steel Co. will build large steel and concrete addition to wire mill. Work will be done by day labor.

★**O., Akron**—Goodyear Tire & Rubber Co., East Market St., let contract building 3 story, 120 x 340 ft., concrete, steel and brick machine shop, rein.-con. flooring, concrete foundation, to Hunkin-Conkey Constr. Co., Century Bldg., Cleveland. About $250,000.

★**O., Cincinnati**—Berghausen Chemical Co., 307 East 2nd St., let brick contract for 1 and 2 story, 50 x 150 ft. warehouse and office building, on Richmond and Carr Sts., to A. Hitzman, 2614 Spring Grove Ave.; excavation and cement work, to F. B. Geier; carpentry, to O. Schroeder, 15 East Rochelle Corv.; iron work, W. Lang & Sons Co., 2128 Patterson St.

★**O., Cincinnati**—Gibson Art Co., Elm St. between 4th and 5th Sts., let contract constructing 6 story, 146 x 168 ft., brick and terra cotta factory and office building, on 4th and Plum Sts., to Frank Hill Smith Co., Inc., 1035 Reibold Bldg., Dayton.

★**O., Cleveland**—Amer. Borvisk Co., West 98th St. and Walford Ave., let contract constructing 1 story, 58 x 156 ft., steel and brick mechanic's building, brick foundation, to W. Dunbar Co., 8201 Cedar Ave. About $50,000.

★**O., Cleveland**—Briggs Mfg. Co., East 131st St. and Taft Ave., let contract building 2 story, 98 x 176 ft., steel and brick factory, concrete foundation, on Taft Ave., to E. Paulsen, Erie Bldg. About $100,000.

★**O., Cleveland**—Christian-Schwarzenberg & Gaede Co., archts., Euclid Bldg., let contract to Ruple Constr. Co., Avenue Bldg. constructing 2 story, 83 x 95 ft. brick factory, brick foundation, on West 25th St. and Meyer Ave., for Lion Knitting Mills Co., 1051 Power Ave. About $60,000.

★**O., Cleveland**—Harshaw-Fuller-Goodwin Co., Newburg Ave., let contract building 1 story, 85 x 160 ft., steel and brick factory and warehouse, brick foundation, to Hunkin-Conkey Constr. Co., Century Bldg. About $30,000.

★**O., Dayton**—Stanley Mfg. Co., Cannon St., let contract building 3 story, 40 x 80 ft., rein.-con. factory, rein.-con. flooring, concrete foundation, to Frank Hill Smith Co., Inc., 1035 Reibold Bldg. About $25,000.

★**O., Newark**—Pharis Tire & Rubber Co. let contract building 3 story, 100 x 120 ft. addition to plant, mill construction, to State Constr. Co., 11 West State St., Columbus. About $100,000.

★**Ind., Indianapolis**—Cole Motor Car Co., 750 East Washington St., let contract building 4 story, 179 x 225 ft. rein.-con. auto assembly building, concrete foundation and flooring, on Market and Davidson Sts., to Bedford Stone & Constr. Co., 810-15 Fletcher Savings & Trust Bldg. About $250,000.

★**Mich., Detroit**—Feigenson Bros., 118 Benton St., let contract building 3 story, 82 x 90 ft., rein.-con. bottling works, rein.-con. flooring, concrete foundation, on Erskine and Beaubien Sts., to Fidler & Gales, 218 Harmon Ave. About $30,000.

★**Mich., Detroit**—Genl. Motors Corp., 435 Woodward Ave., let contract building 1 story garage, also 1 story, 26 x 26 ft., rein.-con. and brick pumping station, rein.-con. flooring, concrete foundation, on Holbrook Ave., to W. E. Wood Co., 1805 Ford Bldg.

★**Mich., Detroit**—Hupp Motor Car Co., Milwaukee and Mt. Elliott Aves., let contract building 4 story, 73 x 396 ft. and 4 story, 73 x 248 ft. factories, rein.-con., brick and steel, rein.-con. flooring, concrete foundation, on Milwaukee and Moran Aves., to E. Winter, Chamber Commerce Bldg.

★**Ill., Chicago**—Channel Chemical Co., 58 East Washington St., let contract building 4 story, 150 x 300 ft. factory, heavy mill construction, concrete foundation, on Western Ave. and West 45th St., to Davidson & Weiss, 53 West Jackson Blvd. About $450,000.

★**Ill., Chicago**—Guyton & Cumfer Mfg. Co., 4451 Fillmore St., let contract building 2 story, 60 x 130 ft. machine shop, mill construction and pressed brick, concrete foundation, at 4430 Fillmore St., to R. L. Brokob, 5448 Flournoy St. About $60,000.

★**Ill., Chicago**—T. R. Bishop, archt., 35 South Dearborn St., let contract to J. C. Stellwagen, 1583 Clybourne Ave., building 3 story, 110 x 160 ft., heavy mill construction factory, concrete foundation, on Lake St. and Kildare Ave., for Playerphone Talking Machine Co., 338 North Kedzie Ave. About $110,000.

★**Ill., Chicago**—W. Teuch & Co. and Brockman & Co., 740 North Franklin St., let contract building 1 story, 125 x 130 ft. printing plant, mill construction, at 2220 Racine Ave., to B. J. Regnell Co., 19 South La Salle St. About $50,000.

★**Wis., Milwaukee**—Kirchhoff & Rose, archts. and engrs., Majestic Bldg., let contract to Raulf Co., Patton Bldg., constructing 2 story, 102 x 255 ft. service station, rein.-con. and brick, rein.-con. flooring, concrete foundation, on North Ave., here, for Cadillac Motor Car Co., 1340 Cass St., Detroit, Mich. About $200,000.

★**Wis., Milwaukee**—W. S. Seaman Co., 480 Virginia St., let contract building 3 story, 100 x 420 ft., steel and brick factory, concrete foundation, on Richards and Lake Sts., to Klug & Smith Co., 40 Mack Blk. About $400,000.

★**Wis., Milwaukee**—Walsh Harness Co., 330 1st Wisconsin Natl. Bank Bldg., let contract building 1 story, 50 x 200 ft., brick and mill construction factory, concrete foundation, on Hubbard and Keefe Sts., to Wilke Bros., 1011 Island Ave. About $60,000.

★**Wis., Racine**—Harvey Spring & Forging Co., 17th and Murray Sts., let general contract building 2 story, 100 x 200 ft., brick and steel factory, concrete foundation, to Wisconsin Bridge & Iron Wks., North Milwaukee; masonry, to Nelson & Co., Robinson Bldg. Total cost, $60,000.

★**Minn., Duluth**—Klearflax Rug Co., 63rd Ave. W. and Grand Ave., let contract constructing 1 story, 66 x 98 ft. and 55 x 56 ft. addition to present 4 story factory and 2 story, 65 x 98 ft. building west of present factory, rein.-con. and brick, rein.-con. flooring, concrete foundation, to McLeod & Smith, Sellwood Bldg. About $65,000.

★**Minn., Grand Rapids**—J. C. Jacobson, engr., Metropolitan Band Bldg., Minneapolis, let contract to Siems, Helmers & Schaffner, 514 Guardian Life Bldg., St. Paul, building electric power plant, including 1000 ft. dam and 1500 h.p. developer and equipment, for Prairie River Power Co. About $150,000; cost plus percentage basis.

Minn., Hastings—State Bd. Control, Capitol, St. Paul, received bids Dec. 7, building 1 story, 45 x 140 ft., rein.-con. and brick power house, including tunnel, at State Hospital for Insane, here, from W. O'Neil & Son, Faribault, $56,458; C. Ash & Son, 202 Maria Ave., St. Paul, $56,672; N. P. Fransen, 628 Endicott Bldg., St. Paul, $68,940.

★**Kan., Topeka**—R. Knowles let contract building 1 story, 50 x 130 ft., brick, rein.-con. and steel garage and sales room, rein.-con. flooring, concrete foundation, to Lundgren & Carlson, 213 Jackson St. About $75,000; cost plus percentage basis.

★**Ore., Portland**—Aladdin Co., 607 Yeon Bldg., purchased plant of Stay-Round Silo Co., Peninsular Mfg. Dist., and will double present capacity and construct 2 story, 125 x 400 ft. frame addition. Work will be done by day labor under supervision of construction department of company. About $50,000.

★**Ont., Braeside**—Gillies Bros., Arnprior, let contract building 2 story, 73 x 190 ft., concrete, steel and brick sawmill and box factory, rein.-con. flooring, concrete foundation, here, to A. F. Byers & Co., 340 University St., Montreal. About $100,000.

★**Ont., Thorold**—Beaver Board Co. let contract building 3 story, 60 x 80 ft., concrete, steel and brick factory, rein.-con flooring, concrete foundation, to Carswell Constr. Co., 58 Wellington St., Toronto. About $75,000.

★**Ont., Toronto**—Baldwins, Ltd., Ashbridge Bay St., let contract building 1 story, 70 x 800 ft., concrete, steel and brick mill, rein.-con. flooring, concrete foundation, to Canadian Allis-Chalmers, Ltd., 212 King St., W. About $200,000. Noted July 10.

★**Ont., Toronto**—Dunlap Tire & Rubber Goods Co., 224 Booth Ave., let concrete contract for 6 story, rein.-con. factory, to V. Gray Constr. Co., Confederation Life Bldg.; cost plus percentage basis.

★**Ont., Toronto**—Prest-O-Lite Co., Inc., 120 Elm St., let contract building 3 story, concrete and brick factory, rein.-con. flooring, concrete foundation, on Hillcrest Race Course, to Wells & Gray, Confederation Life Bldg. About $400,000; cost plus percentage basis.

★**Ont., Toronto**—Wiflard Chocolates, Ltd., 443 Wellington St., W., let contract building 5 story, 80 x 150 ft., concrete, steel and brick factory, rein.-con. flooring, concrete foundation, on Dupont St. and Manning Ave., to Wells & Gray, Confederation Life Bldg. About $150,000; cost plus 10 per cent.

Buildings

PROPOSED WORK

Me., Biddeford—Bank—First Natl. Bank having plans prepared by T. M. James, archt., 3 Park St., Boston, for 1 story, 40 x 100 ft., brick and stone, concrete and tile flooring, concrete foundation. About $50,000.

Mass., Boston—Armory—Commonwealth of Massachusetts having plans prepared by J. E. McLaughlin, archt., 88 Tremont St., for 1 story, brick and steel addition, on Commonwealth Ave. About $50,000.

Mass., Chicopee—Bank—Chicopee Savings Bank, Market Sq., plans to build bank on Center and School Sts. About $100,000. Architect not selected.

Mass., Framingham—Theatre—G. Sumner having plans prepared by Blackall, Clapp & Whittemore, archts., 30 Beacon St., Boston, for 2 story, brick and concrete, on Concord St. About $200,000.

Mass., Hopedale—Housing—Peabody & Stearnes, archts., 53 State St., Boston, soon receive bids building sixteen 2 story brick houses for workmen, stone or concrete foundation, for Draper Corp. About $150,000.

Mass., Springfield—Sales-Cadillac Auto Co. of Boston, 664 Commonwealth Ave., Boston, soon receives bids building 1 or 2 story sales and service station, brick, concrete and steel, concrete flooring and foundation, on Worthington St., here. About $50,000. H. L. Sprague, 310 Main St., archt.

Mass., West Roxbury (Boston P. O.)—High School—Bd. Educ. Boston, having plans prepared by Andrews, Rantoul & Jones, archts., 50 Congress St., Boston, for 3 story, brick and steel, here.

Mass., Worcester—Sales, etc.—H. J. Murch, 731 Main St., plans to build brick and rein.-con. sales and service station, on Park Ave. About $150,000. Cutting, Carlton & Cutting, 44 Front St., archts.

Conn., Ansonia—School—Trade School Comn plans to build trade school on Clifton and Howard Aves. About $100,000. Architect not selected.

Conn., Bridgeport—School—Bd. Educ. plans to build 3 story, (24 room) grammar school on Grand St. and Hurd Ave. About $442,000.

Conn., Bridgeport—Theatre—F. G. Reif, c/o H. E. Koerner, archt., 164 State St., plans to build 1 story, 66 x 110 ft., brick, concrete and stone, concrete foundation, on Boston Ave. About $50,000.

Conn., Hartford—Office, etc.—Goodyear Tire & Rubber Co., High St., plans to build 4 story, 70 x 160 ft., rein.-con. and steel office and storage plant, rein.-con. flooring, concrete foundation, on Winthrop St. About $300,000. Berenson & Moses, Pilgard Bldg., archts.

Conn., Hartford—Store—Bliss, Hill & Steiger having plans prepared by Buchman & Kahn, archts. and engrs., 56 West 45th St., New York City, for 6 story, brick and steel, brick foundation, here.

Conn., Milford—Dormitory—Rosenbaum School, New Haven Ave., having plans prepared by Brown & Von Beren, archts., 185 Church St., New Haven, for 2 story, 70 x 70 ft., brick and steel, on Gulf St. Noted Sept. 11.

Conn., New Britain—Synagogue—Congregation Beth El, 398 Main St., plans to build synagogue on Summer St. About $100,000. Architect not selected.

Conn., New Haven—Church—St. Josephs Roman Catholic Church, 118 Fountain St., having plans prepared by J. A. Jackson, archt. and engr., 1123 Bway., New York City, for 1 story, brick and terra cotta, brick foundation, on Fountain St. About $150,000. J. J. McGivney, pastor.

Conn., West Haven (New Haven P. O.)—Grade School—School Bd. soon lets contract building 2 story, 45 x 137 ft., steel, brick and stone, some rein.-con. flooring, brick and concrete foundation, on Noble St. and Washington Ave. About $75,000. R. W. Foote, 185 Church St., New Haven, archt.

N. Y., Alexandria Bay—Hotel—F. L. Raymond, mgr. Marsden House, Market St., plans to build 7 story, (200 room) frame addition. Cost between $100,000 and $125,000.

N. Y., Brooklyn (Bay Ridge)—Hospital—W. B. Wills, Inc., archts. and engrs., 1101 Myrtle Ave., preparing plans for 5 story, brick and steel, brick foundation. Owner's name withheld.

N. Y., Brooklyn—Office—W. B. Wills, Inc., archts. and engrs., 1101 Myrtle Ave., preparing plans for 12 story, brick and steel, brick foundation. Owner's name withheld.

N. Y., Gabriels—Hospital—Gabriels Hospital having plans prepared by J. R. Pope, archt. and engr., 527 5th Ave., New York City, for group of hospital buildings, brick, steel and stone, brick foundation. About $3,000,000.

N. Y., Malone—Bank—Peoples Bank, East Main St., plans to build bank on Main and Catharine Sts. Cost between $150,000 and $200,000. B. R. Clark, vice pres.

N. Y., Massena—Club—Citizens Club plans to convert Allen House Hotel into club building. About $150,000. Architect not selected.

N. Y., Millbrook—Sanitarium—H. Ross, 47 West 34th St., New York City, having plans prepared by A. Bodker, archt. and engr., 62 West 45th St., New York City, for group of 1 and 2 story, brick and steel buildings, brick foundation, here. About $300,000.

N. Y., New York—Bank—Harriman Natl. Bank, 527 5th Ave., having plans prepared by J. R. Pope, archt. and engr., 527 5th Ave., for altering brick, steel and stone. About $500,000.

N. Y., New York—Church—J. G. Rogers, archt. and engr., 367 Lexington Ave., soon lets contract building 1 story, 40 x 65 ft., brick and steel, on University Ave., for Featherbed Lane Presbyterian Church, c/o architect. About $50,000.

N. Y., New York—Office—McReynolds Realty Corp., 26 West 31st St., having plans prepared by J. B. Snooks, archt. and engr., 261 Bway., for 12 story, 60 x 100 ft., brick, steel and stone, brick foundation, at 52-54 New St.

N. Y., New York—Office—One Hundred Ninety-Five Bway. Corp. having plans prepared by W. W. Boswerth, archt. and engr., 527 5th Ave., for altering 27 story, brick, steel and stone, at 195 Bway. About $5,000,000.

N. Y., New York—Office—Starrett & Van Vleck, archts. and engrs., 8 West 40th St., receive bids about Jan. 8, altering brick and steel office building, brick foundation, at 48-50 West 47th St., for W. H. Wise & Sons, 56 West 45th St. About $50,000.

N. Y., New York—School—Bd. Educ., 500 Park Ave., having plans prepared by C. B. J. Snyder, archt. and engr., Municipal Bldg., for 5 story, 120 x 195 ft., brick and steel, brick foundation, on St. Anns Ave. and Hagney Pl. About $500,000.

N. Y., New York—Stores, Offices, etc.—M. J. Harrison, archt. and engr., 63 Park Row, preparing plans for 11 story, brick, steel and stone, brick foundation, on 5th Ave., and 30th St. About $250,000. Owners name withheld.

N. Y., New York—Theatre—Consolidated Amusement Enterprises, c/o Arena Theatre, 8th Ave. and 40th St., having plans prepared by S. B. Eisendrath, archt. and engr., 18 East 41st St., for brick, steel and stone, brick foundation, on West 50th St. and 8th Ave. About $130,000.

N. Y., New York—Theatre—Loews Enterprises, 1492 Bway., plans to build 1 story, 102 x 189 ft., brick and steel, brick foundation, on Bway. and 83rd St. T. W. Lamb, 644 8th Ave., archt., and engr.

N. Y., Syracuse—Exchange—Superior-Dreadnaught Film Exch. plans to build 3 story, 60 x 120 ft. About $100,000. Architect and engineer not selected.

N. Y., Utica—Church—Central Methodist Episcopal Church plans to build church. About $200,000. A. E. Legg, pastor. Architect not selected.

N. Y., Utica—Theatre and Store—Wilmer & Vincent, Inc., 1451 Bway., New York City, plan to construct modern theatre and store building on Columbia and Washington Sts., here. Cost between $400,000 and $450,000.

N. Y., Watertown—Business—H. Ellis, 302 Court St., plans to build 4 story, brick and concrete, on lower Court St. Cost between $50,000 and $65,000.

N. J., Boonton—School—Bd. Educ. having plans prepared by W. Potter, archt., 22 East 17th St., New York City, for 2 story, brick, steel and stone, brick foundation, here. About $90,000.

N. J., Jersey City—Bank and Office—A. C. Bosson, archt., 366 5th Ave., New York City, receives bids about Jan. 5, building 10 story, brick, steel and stone, brick foundation, on Exch. Pl., for 1st Natl. Bank. About $1,000,000.

N. J., Jersey City—Schools—Bd. Educ. plans to spend over $5,000,000 during 1920 for building new schools.

N. J., Newark—Hotel—Robert Treat Hotel plans to construct 300 room addition to present building. About $75,000.

N. J., Westfield—School—City plans to build 14 room school on Westfield Ave. About $160,000.

Pa., Wilkes-Barre—Bank—Slavonic Banking Institution, 42 East Market St., plans to build 40 x 60 ft., steel, stone and marble, on East Market St. About $75,000. Architect not selected.

Pa., Wilkes-Barre—Store—L. Cohen and S. Heller plan to build 4 story, 50 x 100 ft., concrete, brick and steel, maple flooring, rock foundation, on South Main and Northampton Sts. About $80,000. Architect not selected.

Md., Baltimore—Community—Hampden-Woodberry Neighborhood Assn. having plans prepared by W. H. Emory, Jr., archt., 827 Munsey Bldg., for 2 story, brick and stucco, concrete foundation, on West Park St. About $50,000. C. T. Hewitt, 852 West 37th St., chn. bldg. com.

Md., Baltimore—Temple—Maryland Grand Lodge of A. F. & A. M., Charles and Saratoga Sts., plans to extend temple in rear to new frontage on St. Paul St. About $500,000.

Md., Crisfield—Hospital—McCready Memorial Hospital having plans prepared by H. G. Jory, archt., 1409 Munsey Bldg., Baltimore, for 1 and 2 story, brick and stone, on Main St. About $100,000.

Md., Highlandtown (Baltimore P. O.)—Temple—Loyal Order of Moose, 410 West Fayette St., plans to build 3 story, 75 x 125 ft., here. About $150,000.

Va., Norfolk—Church—Third Christian Church having plans prepared by W. H. Nicklas, archt., 1900 Euclid Bldg., Cleveland, O., for 1 story, 86 x 127 ft. brick, steel and stone, concrete foundation, on Llewellyn Ave. About $100,000.

Va., Roanoke—Hotel—Viscose Co., Marcus Hook, Pa., plans to build concrete and brick hotel for girls, to include gymnasium, rest rooms, dormitory, etc., here. About $300,000. Ballinger & Perrot, 17th and Arch Sts., Phila., archts. and engrs.

N. C., Asheville—Office—Liberty Realty Co. plans to build 3 story, brick addition. About $200,000. Architect not selected.

N. C., Fayetteville—Memorial—Comrs. Cumberland Co. plan to construct Soldiers' Memorial building here. About $150,000. E. V. Edeus, ch. com.

N. C., Greensboro—Hotel—General Green Hotel Co., Greensboro having plans prepared by H. Barton, archt., building 10 story, 125 x 133 ft. brick. About $500,000.

N. C., Smithfield—Court House—Comrs. Johnston Co. plan to build court house. Cost between $300,000 and $400,000. H. Barton, Greensboro, archt.

Miss., Ruleville—Hotel—P. W. Custer plans to build fireproof hotel on Main St. About $75,000. Architect not selected.

Tenn., Oakville—Hospital—Jones & Furbinger, archts., Porter Bldg., Memphis, receive bids about Jan. 1, constructing hospital, including several buildings of various sizes, power and heating plants, etc., for city of Memphis and Shelby Co. About $500,000.

Ky., Frankfort—Hotel—Capitol Hotel Co. soon lets contract building 6 story, rein.-con. and stone. About $200,000. C. C. Weber, 3rd and Walnut Sts., Cincinnati, O., archt.

O., Bedford—School—Bd. Educ. receives bids about Feb. 1, building 2 story, 80 x 164 ft., concrete, steel and brick, concrete foundation. About $200,000. Hamilton & Watterson, Guardian Bldg., Cleveland, archts.

O., Berley (Columbus P. O.)—High School—Bd. Educ. having plans prepared by O. D. Howard, archt., 8 East Broad St., Columbus, for 2 story, 100 x 150 ft., concrete and brick, here. Bonds for $200,000 voted for project.

O., Cincinnati—Church—Christ Scientist Church plans to build on Clifton and Probasco Sts. About $175,000. A. Robinson, Candler Bldg., Atlanta, Ga., archt.

O., Cincinnati—Office—Gibson Art Co., 4th, 5th and Elm Sts., plans to build 146 x 168 ft., rein.-con., on 4th and Plum Sts. About $500,000. Architect not selected.

O., Cleveland—Bank and Office—Citizens Savings & Trust Co. and Union Commerce Bank, Citizens Bldg., receive bids about Feb. 1, building 20 story, 145 x 258 x385 ft., brick, concrete, steel, stone and terra cotta, rein.-con. flooring, concrete foundation, on East 9th St. and Euclid Ave. About $8,000,000. Graham, Anderson, Probst & White, Ry. Exch. Bldg., Chicago, archts.

O., Cleveland—Commercial—A. B. Friedl, 3328 Vega Ave., plans to build 3 story, steel and brick, brick foundation, on East 93rd St. and Kinsman Rd. About $100,000. W. S. Lougee, Marshall Bldg., archt.

Buildings (Continued)

O., Cleveland—Loft—A. Sogg, archt., 319 Hippodrome Bldg., receives bids about Feb. 15, remodeling 5 story, brick and timber, on West 6th St. and St. Clair Ave. About $50,000. Owner's name withheld.

O., Cleveland—Mercantile and Office—A. E. Brown and E. J. Sapp, c/o Carey Roofing Co., to build 4 story, 66 x 190 ft. concrete, steel and brick, rein.-con. flooring, concrete foundation, at 1717 Prospect Ave. About $250,000. Architect and engineer not selected.

O., Cleveland—Office and Temple—Euclid-Malta Co., c/o Colcher & Smith, archts., Lennox Bldg., having plans prepared for 8 story, 64 x 114 ft., concrete, steel, brick and terra cotta, rein.-con. flooring, concrete foundation, on Euclid Ave. and East 105th St. About $200,000.

O., Columbus—Office—A. Crotti, 151 East Broad St., having preliminary sketches prepared for 6 story, 62 x 93 ft., on Town St. and Grant Ave.

O., Dayton—Hotel—Miami Hotel Co., 403 West 1st St., plans to build 6 story, 50 x 160 ft., rein.-con. and brick addition, rein.-con. flooring, concrete foundation, on 2nd and Ludlow Sts. About $100,000. F. H. Pike, pres. Architect not selected.

O., Lakewood (Cleveland P. O.)—Theatre and commercial—Detroit-Lake Ave. Co., 1212 Donald Ave., plans to build 6 story, 190 x 232 ft., concrete, steel and brick, rein.-con. flooring, concrete foundation, on Detroit and Lake Aves. About $600,000. G. W. Armstrong, pres. Architect's name withheld.

O., Marion—School—Bd. Educ. having plans prepared by O. D. Howard, archt., 8 East Broad St., Columbus, for 3 story, 80 x 90 ft., concrete and brick. About $110,000.

O., Put in Bay—Church—St. Mary's Catholic Church, c/o E. J. Scheider, archt., Cuyahoga Bldg., Cleveland, receives bids about May 1, building 1 story, 30 x 84 ft., brick, steel and stone, here About $50,000.

Ind., Ft. Wayne—Sales—Kopf & Woolling, archts., Pythian Bldg., Indianapolis, receive bids about Jan. 10, building 3 story, 80 x 150 ft., rein.-con., brick and terra cotta sales room, concrete foundation, on Washington and Garfield Sts., for E. W. Steinhart Co., St. Wayne and Indianapolis Sts. About $125,000.

Ind., Greensburg—Hospital—Decatur Co. Memorial Hospital Bd. having plans prepared by D. A. Bohlen & Son, archts., Majestic Bldg., Indianapolis, for hospital, here. About $75,000.

Ind., Portland—School—Bd. Educ. having plans prepared by W. Scholer, archt., State Life Bldg., Indianapolis, for 2 story, 62 x 83 ft., brick, steel and stone. About $75,000.

Ind., Shelbyville—Bank—Kopf & Woolling, archts., Pythian Bldg., Indianapolis, receive bids about Jan. 10, building 1 story, 65 x 190 ft., rein.-con., stone and brick, on Pub. Sq., for 1st Natl. Bank, here. About $100,000

Mich., Battle Creek—Dormitory—Kellog Toasted Corn Flake Co. plans to build 3 story, 100 x 218 ft., rein.-con., brick and steel, concrete foundation, to include 40 x 75 ft. concrete swimming pool. About $100,000.

Mich., Detroit—Commercial—A., L. and J. Kahn, Marquette Bldg., preparing plans for 4 story, 140 x 185 ft., rein.-con., brick and steel, rein.-con. flooring, concrete foundation, on Cass Ave. and Peterboro St. About $400,000. Private plans.

Mich., Detroit—Market—Dept. Pub. Welfare, Municipal Courts Bldg., having plans prepared by J. Scott & Co., archts., Dime Bank Bldg., for 1 and 2 story, steel, rein.-con. flooring, concrete foundation, also scale house and incinerator, on Russell and Market Sts. About $120,000.

Mich., Detroit — Theatre — Associated Amusements Co., c/o C. W. Brandt, archt., Kresge Bldg., having plans prepared for 2 story, 120 x 135 ft., rein.-con., brick, steel and stone, rein.-con. flooring, concrete foundation, on Hamilton Blvd. About $250,000.

Mich., Detroit—Theatre—E. Baron, Hastings St., having plans prepared by I. M. Lewis, archt., Congress Bldg., for 2 story, rein.-con. brick and steel, rein.-con. flooring, concrete foundation, on Livingston and Hastings Sts. About $60,000.

Mich., Eaton Rapids—High School—Bd. Educ. having preliminary plans prepared by S. D. Butterworth, archt., 432 Tussing Blk., Lansing, for 2 story, rein.-con. brick, steel and wood, concrete foundation. About $200,000.

Mich., Flint—Home—St. Michael's Parish, c/o R. P. Dunnigan, plans to build 2 story, 40 x 82 ft., brick, steel and stone, tile flooring, brick foundation. About $50,000. VanLeyen, Schilling & Keough, Union Trust Bldg., Detroit, engrs. and archts.

Mich., Grand Rapids—Sanitarium—W. M. Burleson, 148 Fulton St. East, having plans prepared by Osgood & Osgood, archts., Herald Bldg., for 11 story, 105 x 146 ft., rein.-con. brick and steel, rein.-con. flooring, concrete foundation, on Island and and Michell Sts., to Murch Bros., Ry Exch. Jefferson Ave.

Mich., Ironwood—Municipal—City election in January, to vote on $400,000 bonds to construct municipal building.

Mich., Northville—Hospital—Detroit Bd. Health, 233 Antoine St., Detroit, plans to build Municipal Tuberculosis Sanitarium, here, to include 3 story, 41 x 144 ft. administration building, 3 story, 50 x 165 ft. infirmary with two 38 x 182 ft. wings, 2 story, 93 x 127 ft. service building and 2 story, 40 x 120 ft. laundry, all brick and rein.-con., rein.-con. flooring, concrete foundation; 2 story, 38 x 183 ft. ambulant building, with 38 x 84 ft. wing, brick and rein.-con., rein.-con. and wood flooring, concrete foundation; 2 story, 38 x 128 ft. nurses home with 30 x 32 ft. wing, 2 story, 28 x 36 ft. laboratory and 2 story, 34 x 143 ft. buildings for employees with 33 x 21 ft. wings, brick and timber, wood flooring, concrete foundation and 1 story, 48 x 87 ft. power plant, brick and steel. About $1,000,000. Stratton & Snyder, 1103 Union Trust Bldg., Detroit, archts.

Wis., Grand Rapids—Bank—First Natl. Bank having plans prepared by Childs-Smith, archts., Grand Ave., Chicago, Ill., for 2 story, 60 x 125 ft. brick, rein.-con. and steel, brick foundation, on Main St. About $60,000.

Wis., Lancaster—Community—City plans to construct community building, to contain rest rooms, offices, council rooms, gathering room, with kitchen and theatre with 1000 seating capacity. About $100,000. C. Calvery, chn.

Wis., Manitowoc — Theatre — George Bros., 913 South 8th St., having plans prepared by W. J. Raueber, archt., Manitowoc, for 3 story, 100 x 125 ft. brick, rein.-con. and steel, brick foundation. About $150,000.

Wis., Manitowoc—Training School—City plans to convert court house, on 8th St., into training school, also build large brick addition to same. About $60,000. A. Schuetze, cl. Architect not selected.

Wis., Merrill—High Schools—Bd. Educ. having plans prepared by Parkinson & Bockendorff, archts. and engrs., Linker Bldg., La Crosse, for 2 story central school and 3 story, 65 x 150 ft. high school, brick and concrete, rein.-con. flooring, concrete foundation. About $200,000.

Wis., Milwaukee—Gymnasium and Stadium—Marquette University, 1115 Grand Ave., plans to build 2 story, 139 x 147 ft., brick and concrete gymnasium, rein.-con. flooring, and rein.-con. stadium, on 15th and Clybourn Sts. About $200,000. E. Brielmeier & Sons Co., University Bldg., archts. and engrs.

Wis., Milwaukee — Nurses' Home—Mt. Sinai Hospital, 246 12th St., plans to build 3 story, rein.-con and brick, rein.-con. flooring, concrete foundation. About $50,000. E. Brielmeier & Sons Co., University Bldg., archts. and engrs.

Wis., Milwaukee — School—Bd. Educ. plans to build 2nd unit of continuation school, 6 story, rein.con. and brick, rein.-con. flooring, concrete foundation, on 7th and Prairie Sts. About $250,000. Van Ryn & De Gelleke, Caswell Blk., archts. and engrs.

Wis., Oshkosh — Hospital — Mercy Hospital, 185 Hazel St., plans to build 4 story, rein.-con. and brick addition to hospital, rein.-con. flooring, concrete foundation. About $300,000. E. Brielmeier & Sons Co., University Bldg., Milwaukee, archts. and engrs.

Wis., Owen—Hospital—Clark Co. plans to build 3 story, brick and rein.-con. hospital for insane, brick foundation. Bonds for $200,000 voted for project. Architect not selected.

Wis., Racine—High Schools—Bd. Educ. will receive competitive sketches about Feb. 1, for junior high school, cost $200,000, also high school, on 12th St., $500,000, both brick, rein.-con. flooring. J. J. Moritz, secy. Architect not selected.

Ia., Atlantic—Church—First Methodist Episcopal Church having plans prepared by W. C. Jones, archt., 907 North La Salle St., Chicago, Ill., for 2 story, 80 x 100 ft. brick, concrete and steel, concrete foundation. About $75,000.

Ia., Dayton—School—Bd. Educ., Consolidated Dist., receives bids about Jan. 15, building 2 story, 55 x 75 ft., brick, rein.-con. and steel, rein.-con. flooring, rock foundation. About $75,000. W. E. Ellise & Co., 210 Masonic Temple, Des Moines, archts.

Ia., Randall—School—Bd. Educ. voted $80,000 bonds to build 2 story school. Architect and engineer not selected.

Minn., Hibbing—School—C. H. Everett, chn. Bd. Educ., receives bids about Jan 15, building 2 story, 385 x 400 ft., rein.-con. and brick, rein.-con. flooring, in Central Div. About $330,250. W. T. Bray, Torrey Bldg., Duluth, archt. and engr.

Minn., Robbinsdale—School—Bd. Educ. plans to build 2 story, fireproof. About $125,000. H. H. Livingston, Robbinsdale, archt.

Minn., St. Paul—Home—Bd. Trustees of Jewish Home for Aged having plans prepared by C. H. Johnson, archt., 715 Capital Bank Bldg., for 2 story, at 75 Wilkin St. About $100,000. J. Levy, c/o St. Paul House Furnishing Co., 41 East 7th St., pres.

Kan., Wellington—Auditorium—City receives bids about Jan. 2, building 2 story, 90 x 120 ft., brick, rein.-con. and steel, rein.-con. flooring, concrete foundation. About $125,000. C. Boller & Bro., Kansas City, Mo., archts.

Kan., Wichita—Business—Western Lithographic Co., 125 North Emporia Ave., having plans prepared by L. Schmidt, archt., 121 North Market St., for 3 story, 140 x 150 ft. brick, rein.-con. and steel, rein.-con. flooring, concrete foundation, on 1st and Lawrence Sts. About $150,000.

Neb., Fremont—Bank—Nebraska State Bldg. & Loan Assn. and Fremont State Bank plan to remodel bank, steel, concrete and brick, rein.-con. flooring. About $100,000. Architect not selected.

Wyo., Sheridan—School—School Dist. No. 7 soon lets contract building 3 story grade school. About $100,000. Randal & Jordon, Sheridan, archts.

Mont., Butte—Lodge—Odd Fellows Fidelity Lodge No. 8 plans to build 3 story, 58 x 110 ft., on Main and Galena Sts. About $250,000. Architect not selected.

Mo., St. Louis—Hotel—Letmar Club Assn., 3648 West Pine Blvd., plans to build brick hotel, rock foundation, at 3648 West Pine Blvd. About $50,000. Architect not selected.

Okla., Cushing—Hospital—City plans to build hospital. About $50,000. Architect and engineer not selected.

Okla., Henryetta—Depot—Missouri, Oklahoma & Gulf R.R. plans to build passenger and freight depot, here. About $50,000. C. N. Van Natta, Muskogee, ch. engr. Architect and engineer not selected.

Okla., Okmulgee — Schools — Bd. Educ. voted $238,000 bonds to build schools. Architect and engineer not selected. R. W. Adkinson, clk.

Colo. Denver—City plans election soon to vote on $85,000 bonds to build new school in Berthoud Dist.

Colo., Mineral Hot Springs—Bath House and Pavilion-Mineral Hot Springs Resort Co. plans to build 1 story, 40 x 100 ft. rein.-con. bath house, tile flooring, rein.-con. foundation, 1 story, 80 x 15 ft. frame dancing pavilion, wooden flooring, concrete foundation and 1 story, 55 x 150 ft. rein.-con. garage. Total cost $100,000. W. N. Bowman, Central Bank Bldg., Denver, archt.

Ariz., Fort Defiance—Administration and Dormitories—Home Missionary Bd. of Presbyterian Church of United States having plans prepared by H. M. Patterson, archt., 325 O. T. Johnson Bld., Los Angeles, for 2 story, sandstone administration building, 2 dormitories (each to accommodate 50 pupils) and 4 cottages. Cost to exceed $50,000.

Ariz., Yuma — School — Trustees School Dist. No. 1 soon receive bids building brick, concrete foundation. Former bids rejected. F. R. Ingle, Bd. Trade Bldg., clk. N. F. Marsh, 211 Bway. Central Bldg., Los Angeles and V. O. Wallingford, Goodrick Bldg., Phoenix, archts. Noted Aug. 21.

Wash., Seattle—Hospital—J. T. Mason, et al, Alaska Bldg., plan to build 6 story, 44 x 100 ft., rein.-con., brick and tile, on Terry and Spring Sts. About $130,000. Bebb & Gould, Securities Bldg., archts.

Wash., Seattle—Hotel—O. Dickinson, archt., Seaboard Bldg., preparing plans for 4 story, 50 x 120 ft., brick, on Westlake and Pine Sts. About $80,000. Owner's name withheld.

Buildings (Continued)

Wash., Seattle—Office—Medical Bldg. Co., Cobb Bldg., having plans prepared by Bebb & Gould, archts., Securities Bldg., for 10 story, 54 x 120 ft., on Madison and Minor Aves. About $400,000.

Wash., Seattle—Sales—Cascade Motor Sales Co., 8th and Pine Sts., plans to build 2 story, 100 x 100 ft., concrete and brick, on 12th and Madison Sts. About $78,000. V. W. Voorhees, Eitel Bldg., archt.

Wash., Yakima—Schools—City plans to build 1 or 2 story, brick or concrete high school, also addition to McKinley School. Bonds for $225,000 voted for project. Architect not selected.

Ore., Gearhart — Hotel — Citizens of Seattle, Wash., and Portland and Astoria having preliminary plans prepared for 2 or 3 story, modern hotel, on 450 x 650 ft. site adjoining golf links, here. About $200,000. Architect not selected. Address J. L. Meier, c/o Meier & Frank, 5th and Morrison Sts., Portland.

Cal., Elk Grove—High School—School Trustees having plans prepared by G. C. Sellon, archt., 1005 8th St., Sacramento, for high school, here. About $175,000.

Cal., Piedmont—(Oakland P. O.)—School Trustees Piedmont High School Dist. plan election to vote on $250,000 bonds to build school.

Cal., San Francisco — Sales — Pioneer Motor Co., 307 Golden Gate Ave., plans to build 5 story, 120 x 220 ft., rein.-con., on Van Ness Ave. and McAllister St. G. Peak, mgr. Architect not selected.

Cal., San Francisco—School—Bd. Educ. having plans prepared for Grant School, on Baker St. and Bway. About $200,000.

Cal., San Leandro—City Hall—City plans election to vote on $50,000 bonds to build city hall.

Ont., Belleville—School—Bd. Educ. plans to build 2 story school. About $125,000. A. McGie, chn. Architect not selected.

Ont., Brantford—Hospital—City election in January to vote on $87,000 by-law to build new isolation hospital and $78,000 to remodel present one. T. H. Jones, City Hall, engr.

Ont., Chatham—Hospital—Pub. Gen. Hospital Bd., 106 Emma St., having plans prepared by Watt & Blackwell, archts., 64 Bank of Toronto Chambers, London, for 3 story, concrete, steel and brick, rein.-con. flooring, concrete foundation, here. About $140,000.

Ont., Hamilton—Store—Arcade, Ltd., 43 James St., N., plans to build 6 story, 80 x 120 ft., concrete, steel and brick, rein.-con. flooring, concrete foundation. About $300,000. McPhie & Kelly, 701 Bank of Hamilton Bldg., archts.

Ont., London—Exchange—Bell Telephone Co., 118 Notre Dame St., W., Montreal, plans to build 1 story, 60 x 80 ft., concrete and steel addition, concrete flooring, here. About $100,000. W. J. Carmichael, 29 Hospital St., Montreal, archt.

Ont., London—Seminary—Diocese of London having plans prepared by McGinnis & Walsh, archts., Boston, for 3 story, 85 x 400 ft., stone. Tenders will be called about end of March. About $500,000. Address A. Fallon, 90 Maple St., Bishop.

Ont., Mailorytown—School—Consolidated School Bd. having plans prepared by B. Dillon, archt., King St., Brockville, for 2 story, concrete, steel and brick, concrete foundation. About $160,000.

Ont., Oshawa — Church — Methodist Church Bd. plans to build 1 story, steel and brick, concrete foundation, on Simcoe St. About $75,000. Architect not selected.

Ont., Ottawa—City Hall—City plans to build 3 story, 100 x 200 ft., city hall, fire station and memorial hall, concrete, steel, brick and stone, rein.-con. flooring, concrete foundation. About $2,500,000. W. E. Noffke, Central Chambers Bldg., archt.

Ont., St. Thomas—School—Bd. Educ. plans to build 2 story, concrete, brick and steel, rein.-con. flooring, concrete foundation, on Elm St. and Wilson Ave. About $75,000. J. Darrach, St. Thomas, archt.

Ont., Sudbury—School—High School Bd. plans to build 3 story, 20 roomed, concrete, steel and brick, concrete foundation. About $200,000. Architect not selected.

Ont., Toronto—Lavatories—Bd. Control soon receiving bids building stucco and terra cotta, tile flooring. About $65,000. W. H. Pearse, city archt.

Ont., Trenton—Exchange—Bell Telephone Co., 118 Notre Dame St., W., Montreal, plans to build 3 story, 40 x 60 ft., concrete, steel and brick, rein.-con. flooring, concrete foundation. About $60,000. W. J. Carmichael, 29 Hospital St., Montreal, archt.

TUNNEL—PITTSBURGH, PA.

Bids were received by Commissioners of Allegheny County, Dec. 2nd, for constructing Liberty Tunnel through South Hills, from (A) Booth & Flinn, Ltd., 1942 Forbes St., (awarded contract); (B) John F. Casey Co., Union Arcade; (C) Mellon-Stuart Co., Oliver Bldg., Rinehart-Dennis Co., Roanoke, Va.; (D) James H. McQuade & Sons Co., Bakewell Bldg., $5,658,386; (E) Smith, Hauser & Mels..acs, 18 East 41st St., New York City, $5,146,008. The unit bids of the lowest 3 bidders were as follows:

	A	B	C
5,690 lin.ft. of completed tunnel (lump sum)	$722 04	$702 00	$736 00
160,000 sq.ft. of waterproofing over tunnel arches	25	66	35
116,000 cu.yd. of excavation in two approaches (North Side)	1 80	2 66	2 00
11,000 cu.yd. of excavation in two approaches (South Side)	3 00	2 52	2 00
4,000 cu.yd. concrete masonry in portals and retaining walls (North Side)	10 00	14 93	14 80
2,800 cu.yd. concrete masonry in portals and retaining walls (South Side)	14 00	14 93	14 80
2,000 cu.yd. facing walls in two approaches (North Side)	10 00	14 93	14 80
500 cu.yd. facing walls in two approaches (South Side)	14 00	17 33	14 80
200,000 lb. of reinforcing steel bars in approaches	02	05	08
15,000 lb. of reinforcing steel, fabric, mesh or expanded metal	01	11	10
10,000 lb. of structural steel shapes in concrete	01	10	08
400 lin.ft. of 2½ inch iron pipe railing in two approaches	2 00	3 00	1 00
6,600 sq.yd. of brick paving in two approaches	4 00	4 00	5 75
1,575 sq.yd. of stone block paving in approaches	4 00	6 50	8 00
1,510 lin.ft. of concrete curb in approaches	1 35	2 05	1 40
12,340 sq.ft. of concrete sidewalks in approaches	25	36	45
750 lin.ft. of street railway tracks	9 00	9 70	8 50
1,000 lin.ft. of terra cotta drain pipe in approaches	25	36	60
1,000 lin.ft. of porous drain tile in approaches	15	30	26
1,020 lin.ft. of 15-in. terra cotta pipe sewers in approaches	5 00	1 35	83
300 lin.ft. of terra cotta pipe sewers, 9-in. and less	1 00	75	70
6 sewer manholes in approaches	90 00	180 00	88 00
6 sewer inlets in approaches	50 00	180 00	37 50
400 lin.ft. of 6-in. cast iron water pipe in approaches	2 00	1 80	2 13
3 6-in. hub gate valves with large iron boxes	50 00	20 00	26 00
560 cu.yd. of concrete in saw mill run bridge 1-2-4 mix	30 00	16 00	15 60
970 cu.yd. of concrete in saw mill run bridge 1-2½-5 mix	22 00	12 00	15 00
8000 sq.ft. of waterproofing over arch in saw mill run bridge	20	60	35
750 cu.yd. of gravel fill over arch in saw mill run bridge	3 50	3 00	3 00
Extended totals	$4,593,259	$4,671,161	$4,746,207

BIDS DESIRED

Conn., New Haven—Loft, Offices, etc.—Brown & Von Beren, archts., Chamber Commerce Bldg., receiving bids building 8 story, 80 x 80 ft., brick and stone, concrete foundation, for J. Kilfeather, Meadow St. About $125,000.

W. Va., Charleston—Office—Until Jan. 15, by C. H. Higgins, archt., 19 West 44th St., New York City, building 7 story, 100 x 150 ft., brick, stone and steel, on Virginia and McFarland Sts., for Abney Barnes & Co., 812-18 Virginia St.

Tenn., Memphis—School—Until Jan. 1, by Mahan & Broadwell, archts., Amer. Bank Bldg., constructing 2 story, brick and hollow tile, for city. About $55,000.

O., Middletown—Business—Until Jan. 5, by C. E. Oeden, archt., Knights of Pythias Bldg., constructing 2 story, 60 x 110 ft., brick, steel and stone, tile and concrete flooring, brick foundation, on 3rd and Clinton Sts., for Lewis Bros., Main St. About $50,000.

O., Upper Sandusky—School—Until Jan. 5, by Bd. Educ., building 2 story, 65 x 70 ft. centralized school in Salem Twp., Wyandotte Co. About $85,000. O. Gotlieb, R. F. D., clk. O. D. Howard, 8 East Broad St., Columbus, archt.

Ill., Kewanee—Church—R. G. Pierce, archt., 10 South La Salle St., Chicago, receiving bids remodeling 2 story, 70 x 100 ft., brick, for Kewanee Methodist Episcopal Church. About $75,000. N. Ronneberg, 10 South La Salle St., Chicago, engr.

Wis., Westby—Church—Until Jan 10, by C. Volkman, archt., 106½ Grand Ave., Eau Claire, building 60 x 70 ft., brick and tile, brick and concrete foundation, for Our Saviour's Evangelical Lutheran Church. About $50,000. S. Rondestvedt, pastor.

Ia., Laurel—School—Until Jan. 8 by Bd. Educ., Consolidated Dist., building 2 story, 80 x 120 ft. brick, rein.-con. and steel. About $90,000. H. E. Reimer, Marshalltown, archt.

Minn., Duluth—Bank and Office—Until Feb. 1, by F. G. Beamsly, cashier Duluth State Bank, West Superior St., building 2 story, 50 x 140 ft., brick and stone, rein.-con. foundation, on Superior St. and 20th Ave., W. About $75,000. Holstead & Sullivan, Palladio Bldg., engrs. and archts.

Minn., East Grand Forks—School—Until Jan. 15, by J. A. Noonan, secy. Independent School Dist. No. 3, Polk Co., building 3 story, 130 x 170 ft., rein.-con., brick and stone, rein.-con. flooring, concrete foundation, on Kittson Ave. and 6th St. B. D. Beck, Grand Forks, N. D., engr. and archt.

Mo., Joplin—Office and Salesroom—Joplin Supply Co., 3rd and Walls Sts., receiving bids building 3 story, 75 x 120 ft., rein.-con., steel and brick, rein.-con. flooring, concrete foundation. About $125,000. Smith, Rea & Lovitt, Finance Bldg., Kansas City, archts.

Okla., Oklahoma—Sales—Deignan Motor Co. receiving bids constructing 2 story, 100 x 190 ft. brick, rein.-con. and steel, sales and service building, rein.-con. flooring, concrete foundation. About $100,000. F. C. Gunn, 1606 West 39th St., Kansas City, Mo., archt.

Cal., Madera—School—Until Jan. 5, by Trustees Union High School Dist., constructing 2 story, brick and concrete auditorium and class room building. About $100,000. Swartz & Ryland, Rowell Bldg., Fresno, archts.

Que., Three Rivers—Hippodrome—Until Jan. 20, by J. B. Richer, building 100 x 200 ft., rein.-con., rein.-con. flooring, rock foundation, on Forges, Royal and St. George Sts. About $250,000. J. Irudel, Viauville St., Montreal, engr.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

★**Mass., Amherst**—Memorial—Massachusetts Agricultural College let contract building 2 story, 60 x 120 ft., brick and stone, rein.-con. flooring, concrete foundation, on campus, to E. F. Carlson Co., 393 Main St., Springfield. About $150,000.

★**Mass., Boston**—Office—F. D. Holdsworth & Co., 30 State St., let contract building 7 story, rein.-con. and steel, on Doane St., to Evatt Constr. Co., Devonshire St.

★**Mass., Brockton**—Business—F. S. Howard, Inc., Main St., let contract building 3 story, 50 x 135 ft., brick and frame construction, concrete foundation, on White Ave., to W. Hanson, 567 Pleasant St. About $50,000.

★**Mass., Brookline** (Boston P. O.)—Sales, etc.—L. Shapiro, 27 School St., will build 2 story, 85 x 270 ft., concrete and stone sales and service station, concrete flooring and foundation, on Commonwealth Ave. About $250,000. Work will be done by day labor.

★**Mass., Southbridge**—Church—St. Hedwigs Polish Church let contract building 1 story, 46 x 93 ft. with 50 ft. steeple, brick and timber, concrete foundation, on Everett St., to J. G. Ray & Sons Co., 21 Silver St., Springfield. About $50,000.

★**Mass., Springfield**—Business—Forbes & Wallace, 392 Main St., let contract building 8 story, 80 x 100 ft., brick, concrete and steel addition, rein.-con. flooring, concrete foundation, on Main and Vernon Sts., to E. J. Pinney, 374 Main St.

★**R. I., Arctic**—Theatre—A. A. Spitz, C. Misch Bldg., Providence, let contract building 2 story, brick, concrete and steel, concrete flooring and foundation, to C. I. Bigney Constr. Co., 898 Westminster St., Providence. About $100,000.

Buildings (Continued)

★**Conn., Bridgeport**—School—Bd. Educ. let general contract building 2½ story, 118 x 130 ft., brick and steel addition to McKinley School, concrete foundation, on Kelsey St., to M. Noonan, Tracey St., $153,753; plumbing and heating, to H. D. Fitzgerald, Bassick Ave., $22,000.

★**N. Y., Brooklyn** (Bensonhurst) — Bank —West End Bank, c/o Holmes & Winslow, archts. and engrs., 110 West 40th St., New York City, let contract building 1 story, 30 x 90 ft., brick, steel and stone, brick foundation, on 20th Ave. and 86th St., to F. G. Fearon, 280 Madison Ave., New York City. About $50,000.

★**N. Y., Brooklyn** (Bensonhurst)—Bank —Studebaker Corp. of Amer., 1751 Bway., New York City, let contract building 5 story, 60 x 100 ft., steel, at 1469-1471 Bedford Ave., to G. A. Fuller Co., 175 5th Ave., New York City.

★**N. Y., Brooklyn**—Theatre—J. Hilder, 271 75th St., will build 2 story, 157 x 175 ft., brick and steel, brick foundation, on Bway. and Chauncey St. About $175,000. Work will be done by day labor under supervision of Carlson & Wiseman, archts. and engrs., 226 Henry St.

★**N. Y., Brooklyn** — Theatre — Kingway Realty Co., c/o Carlson & Wiseman, archts. and engrs., 226 Henry St., will build brick and steel brick foundation, on Kings Highway and East 12th St. About $300,000. Work will be done by day labor, under supervision of archts.

★**N. Y., New York**—Hotel—Warren & Wetmore, archts. and engrs., 16 East 47th St., let contract to Thompson-Starrett, 49 Wall St., building 16 story, brick, steel and stone, brick foundation, on Park Ave. between 49th and 50th Sts. Owners name withheld.

★**N. Y., New York**—Loft—Hamilton Press, Inc., 40 Stone St., let contract altering 6 story, 80 x 100 ft., brick and steel, on Trinity Pl. and Thames St., to F. J. McWalters, 225 5th Ave. About $75,000.

★**N. Y., New York**—Office—International Tailoring Co., 97 East Houston St., will build 12 story, 116 x 142 ft., brick, steel and stone, brick foundation, on 4th Ave. and 12th St. About $750,000. Work will be done by day labor under supervision of Starrett & Van Vleck, archts., 8 West 40th St. Noted Aug. 14.

★**N. Y., New York**—Office—Lawyers Title & Trust Co., 160 Bway., let contract building 11 story, 50 x 106 ft., brick and steel, brick foundation, to G. B. Beaumont, 286 5th Ave.

N. Y., New York—Office—F. T. Ley, 19 West 44th St., will build 20 story, brick, steel and stone, brick foundation, on 42nd St. and Madison Ave. About $2,000,000. Work will be done by day labor.

★**N. Y., New York**—Offices, Stores, Theatre—G. Backer, 20 East 32nd St., will build 30 story, 100 x 162 ft., brick, steel, and stone, brick foundation, on 57th St. and 5th Ave. About $6,000,000. Work will be done by day labor.

★**N. Y., New York**—Theatre—W. Fox Amusement Co., 126 West 46th St., will build brick and steel, brick foundation, on Tremont and Washington Aves., (3500 seating capacity). About $400,000. Work will be done by day labor under supervision of Carlson & Wiseman, archts. and engrs., 226 Henry St., Brooklyn.

N. Y., Wards Island—Hospital—State Hospital Comn., Capitol, Albany, received bids Dec. 17, building 2 story, 58 x 98 ft., brick and rein.-con., concrete foundation, for Manhattan State Hospital, here, general contract, from M. Kantrowitz, 20½ Market St., Albany, $137,800 (180 working days); heating, from Leslie & Tracy, Inc., 5 Columbus Circle, New York City, $6300, Gillis & Geoghegan, 537 West Bway., New York City, $7180, Ryan Plumbing & Heating Co., Inc., Light and Power Bldg., Watertown, $7700; plumbing, from Ryan Plumbing & Heating Co., Inc., Light and Power Bldg., Watertown, $10,600, C. H. Darmstadt, Inc., 352 West 43rd St., New York City, $10,795.

★**N. Y., Woodhaven** (Jamaica P. O.)—Theatre—J. Hartman, 857 111th St., Richmond Hill, will build 1 story, 80 x 130 ft., brick and steel, brick foundation, on Boyd Ave., here. About $80,000. Work will be done by day labor under supervision of Carlson & Wiseman, archts. and engrs., 226 Henry St., Brooklyn.

★**Va., Richmond**—Hospital—Stuart Circle Hospital, Lumbardy and Franklin Sts., let contract building 6 story, 40 x 60 ft., rein.-con. and brick addition, on West Franklin St., to J. C. Beazley, 209 Real Estate Exch. Bldg. About $50,000.

★**Ga., Macon**—School—Bd. Educ. let contract building 2 story, 100 x 200 ft., brick and terra cotta, to W. D. Griffin, Macon. About $80,000.

O., Cincinnati—Office—See "Industrial Works."

★**O. Cleveland**—Hotel—J. W. Wilson, 450 Leader-News Bldg., let contract building 4 story, 76 x 270 ft., concrete, brick and steel, rein.-con. flooring, concrete foundation, on East 96th St. and Euclid Ave., to Paul Bros., 528 Citizens Bldg. About $400,000.

Mich., Detroit—Engine House—Fire Comn., Larned St., received bids for masonry work in connection with 2 story, 40 x 80 ft., rein.-con., brick and stone, rein.-con. and wood flooring, concrete foundation, on 12th and LaBelle Sts., from M. Bartholomaei Son & Co., 466 Warren Ave., $49,-200; Corrick Bros., Owen Bldg., $55,730; Lennane Bros., Union Trust Bldg., $59,020; carpentry work, from C. Keller Co., 210 Moran St., $21,920; Yatzek & Wunderlick, 400 Penobscot Bldg., $25,758; heating, plumbing and ventilating, from O'Connor Bros., 34 Roland Bldg., $9209; Irvine & Meier, 2289 Woodward Ave., $10,270; W. J. Rewoldt, Owen Bldg., $10,553.

★**Mich., Detroit**—School—Bd. Educ., 50 Bway., let masonry contract building 2 story, 150 x 211 ft., rein.-con., brick and steel, rein.-con. flooring, concrete foundation, on Maplewood and Spokane Sts., to F. H. Goddard, 516 Frankin St., $187,373; carpentry, to Harcus & Co., 774 Russell St., $47,257; heating, ventilating and plumbing to Irvine & Meier, 2289 Woodward Ave., $81,682; electrical work, to J. Miller & Co., Penobscot Bldg., $12,545.

★**Mich., Detroit**—Theatre—H. C. Keywell, 501 Old Whitney Bldg., let contract building 2 story, 38 x 115 x 190 ft., brick, steel and terra cotta, on Grand River Ave., to D. Fidler, 242 Melbourne Ave. About $90,000.

★**Mich., Detroit**—Theatre—LaSalle Gardens Theatre Co., c/o C. W. Brandt, archt., 1114 Kresge Bldg., let contract building 2 story, 100 x 160 ft., rein.-con., brick and steel, rein.-con. flooring, concrete foundation, to F. Farrington Co., Scherer Bldg. About $200,000.

★**Mich., Flint**—School—St. Mathew's Parish let contract building 2 story, (12 room) rein.-con., brick and steel, rein.-con. flooring, concrete foundation, on Beach St., to Duboise Constr. Co., 1519 North Saginaw St. About $150,000.

★**Ill., Rock Island**—Theatre—Rosenfield & Hopp let contract building concrete, steel and brick, rock foundation, or 19th St. and 3rd Ave., to Brissman & Co., 1412 10th St., Moline. About $250,000.

★**Mo., St. Louis**—School—Bd. Educ. let contract building Roe School. 2 story, 70 x 114 ft., brick, rock foundation, on Prather and Mitchell Sts., to Murch Bros., Ry. Exch. Bldg., $217,520.

★**Tex., Ft. Worth**—Office—N. P. Anderson & Co., Grand and Cotton Exch. Bldg., let contract building 11 story, 60 x 200 ft., concrete, brick and terra cotta, on 7th and Lamar Sts., to W. Hedrick Constr. Co., Ft. Worth Natl. Bank Bldg. About $500,000.

★**Cal., Monterey**—School—Trustees let contract building 14 room. rein.-con. school, here, to T. H. Dean, Monterey, $69,200.

★**Ont., Kingston**—School—Bd. Educ. let general contract building 3 story, (10 room), brick and steel, concrete flooring and foundation, to R. Wallace & Sons, 116 Patrick St., $100,000; electric work, to H. W. Newman Electric Co., Princess St., $5500; plumbing and heating, to Elliot Bros., Princess St., $12,000. Noted June 5.

★**Ont., Orillia**—Bank—Dominion Bank, Dominion Bank Bldg., Toronto, let contract building 3 story, brick, concrete flooring, to E. Webb & Sons, Orillia. About $60,000. Noted Apr. 17.

★**Ont., Toronto**—Hotel—King Edward Hotel, King St., E., let contract altering north wing, to Dickie Constr. Co., Ryrie Bldg. About $50,000.

★**Ont., Toronto**—Store and Office—W. Davies Co., 29 Queen St., W., let contract building 4 story, 36 x 103 ft., concrete, steel and brick, rein.-con. flooring, concrete foundation, to Carswell Constr. Co., 58 Wellington St., Toronto. About $100,-000. Noted Sept. 4.

★**Ont., Windsor**—Bank—Imp[illegible] Bank of Canada, 32 Wellington St., E., [illegible] contract building 3 story, concrete, st[illegible]nd, brick, rein.-con. flooring, concrete [illegible]ndation, to Dickie Constr. Co., Ryrie Bl[illegible], Toronto. About $110,000. Noted Sept [illegible]

Federal Government Work

PROPOSED WORK

Pa., Phila.—Dredging—U. S. Eng. Office, 815 Witherspoon Bldg., soon receives bids dredging Philadelphia Harbor to depth of ft., to begin at foot of Ritner St. and extend up along city front. About $400,000.

Va., Alexandria—Torpedo Storage Racks —Spec. 4111—Bureau Yards & Docks, Navy Dept., Wash., D. C., plans to build here. About $14,105.

Va., Hampton Roads—Removing and Rebuilding—Spec. 4109—Bureau of Yards & Docks, Navy Dept., Wash., D. C., plans to remove Bldg. "D" from Detroit and reerect same here.

S. C., Paris Island—Marine Aviation Field—Spec. 4079—Bureau Yards & Docks, Navy Dept., Wash., D. C., soon receives bids developing marine aviation field, here, to include 4 steel frame and 5 wood frame buildings, concrete flooring and foundation. About $100,000; $10 deposit required for plans and spec.

Wyom'[illegible]—Road Work—J. S. Bright, dist. engr., Bureau Pub. Rds., 301 Custom House, Denver, Colo., receives bids in March improving 8 mi. Encampment Slater Rd., 20 ft. wide, Carlson Co., involving common and rock excav., corrugated metal pipe culverts and short span bridges; 28 mi. Sects. 1-5 and 9-14 Buffalo-Tensleep Rd. Project, 20 ft. wide, Johnson and Washakie Counties, involving 1300 sq.yd. dry rubble, 120 sq.yd. concrete, 120,000 cu. yd. common and 9000 cu.yd. rock excav., 500 lin.ft. piling, 135 lin.ft. log bridges, 4900 sq.ft. log cribs and incidental items. Cost to exceed, $10,000.

Montana—Road Work—Bureau Pub. Rds. U. S. Dept. of Agriculture, Missoula, plans to build 20 mi. Cedar Creek Rd. from near Superior to Cedar Creek Ranger Sta., 8 ft. wide, Mineral Co. About $52,000. C. H. Purcell, Post Office Bldg., Portland, Ore., dist. engr.

Mo., St. Louis—Earth and Levee Work—Mississippi River Comn., 1311 International Life Bldg., soon lets contract building 450,-000 cu.yd. earthwork (327,000 cu.yd. hydraulic fill in old barrow pits and 123,000 cu.yd. levee enlargement) Sny Island D. D., Ill., 260,000 cu.yd. earthwork (172,000 cu. yd. hydraulic fill in old barrow pits and 88,000 cu.yd. on application) for levee enlargement, Hunt D. D., Ill.

Wash., Puget Sound—Dredging—Spec. 4110—Bureau Yards & Docks, Navy Dept., Wash., D. C., plans to dredge at Receiving Ship Pier, here. About $8000. Bids to be opened at Navy Yard, here.

Wash., Seattle—Emergency Dam—U. S. Govt. has commissioned C. D. Young, electrical and mechanical engr., Lumber Exch. Bldg., to prepare plans for emergency dam at Ballard Locks in Lake Washington Canal, swing bridge type with movable wickets and steel construction, operated by electricity. About $400,000.

BIDS DESIRED

N. Y., S. I., New Dorp—Barracks and Quarters, etc.—Until Jan. 10, at Office of U. S. Constr. Quartermaster, 39 Whitehall St., New York City, furnishing labor and material for constructing barracks, quarters, mess hall, post exchange, administration building, etc., here.

Pa., McKeesport—Remodeling Post Office —Until Jan. 8, by Treas. Dept., Wash., D. C., remodeling, here. J. A. Wetmore, supervising archt.

Va., Norfolk—Pattern Shop—Spec. 4041 —Until Jan. 7, by Bureau Yards & Docks, Navy Dept., Wash., D. C., building 4 story pattern shop, 233 ft. long, 126 ft. wide and 78 ft. 3 in. high to top of parapet at Navy Yard, here. About $300,000; $20 deposit required for plans and spec.

Va., Norfolk—Quay Wall—Spec. 4044—Until Jan. 7, by Bureau Yards & Docks, Navy Dept., Wash., D. C., building, here, uncreosoted timber bearings, batter piles and creosoted fender piles and chocks, etc. Former bids rejected.

Mont., Belton—Bridge—Until Jan. 20, by Dept. of Interior, at office of W. W. Payne, supt., Glacier Natl. Park, Belton, furnishing labor and material for building steel or rein.-con. bridge over middle fork of Flathead River, near Belton.

Federal Government Work (Continued)

Cal., Humboldt Bay—Stone—Until Jan. 5, by U. S. Eng. Office, 401 Custom House, San Francisco, furnishing stone for jetty construction, here.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

★**Mass., Watertown**—Storehouse—Constr. Eng., U. S. Army, c/o Arsenal, let contract building 2 story, 50 x 85 ft., brick and steel storehouse, concrete foundation, on Arsenal Grounds, to F. G. Coburn, 295 Washington St., Boston, $52,844.

★**N. Y., New York**—Dredge—U. E. Eng. Office, 39 Whitehall St., let contract building one dipper dredge for East River, to V. R. Browning & Co., 17701 Lake Shore Blk., Cleveland, O. Cost $605,000. Originally awarded for 2 but 1 was revoked.

★**W. Va., Wheeling**—Gate Operating Machinery—U. S. Eng. Office, Wheeling, let contract furnishing and delivering gate operating machinery for Dams. Nos. 23, 25 and 27, Ohio River, to J. B. Milholland Co., New York City, $17,650 each.

★**S. C., Charleston**—Repairing Wharf and Boat House—Treas. Dept., Wash., D. C., let contract repairing, wharf and boat house at Quarantine Sta., here, to Waterfront & Foundation Constr. Co., 51 Broad St., $4107.

S. C., Paris Island—Concrete Walls—Spec. 4096—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids Dec. 17, building at Main Sta. Marine Barracks, here, (1) work complete, from W. T. Hadlow, 15 Baldwin Bldg., Jacksonville, Fla., (1) $4800 (90 days), alternate $4600; Waterfront & Foundation Constr. Co., 51 Broad St., Charleston, (1) $6497 (75 days), (2) add $200; Newport Contg. & Eng. Co., Silsby Bldg., Newport News, Va., (1) $8200 (75 days).

Ky., Dawson Springs—Additional Buildings—Treas. Dept., Wash., D. C., received bids Dec. 10, constructing 3 additional buildings, here, (1) work complete, from King Lumber Co., Charlotteville, (1) $594,000 alt. 1, $2000, alt. 2, $1500, alt. 3, $7000, (2) $319,800 alt. 1, $1000, (3) 109,000 alt. 1, $500, (4) $164,000 alt. 1 $150; Dawson Springs Constr. Co., Dawson Springs, (1) $605,764 alt. 1 $2000, alt. 2 $12,000, alt. 3, $10,332, (2) $334,820 alt. 1 $2000, (3) $93,292 (4) $177,652; Forbes Mfg. Co., Hopkinsville, (1) $648,616 alt. 1 $2850, alt 2, $11,500, alt. 3 $9500, (2) $375,364, alt. 1 $260, (3) $97,325 alt. 1 $100, (4) $175,927 alt 1 $150.

Miscellaneous

PROPOSED WORK

Athletic Field—Hanover, N. H.—Dartmouth College receives bids about Mar. 15, building 3 gridirons (football fields), 3 baseball diamonds, 3 hockey rinks, 11 tennis courts, concrete stand on west side of football grounds, 10,000 seating capacity, bleachers on diamond, 1500 seating capacity, drainage system, etc. About $360,000. H. E. Keyes, business dir.

Amusement Park—Hartford, Conn.—S. A. De Waltoff, 67 California St., West Haven, having plans prepared by Berenson & Moses, engrs., 1026 Main St., for amusement park to include swimming pool, roller coaster, restaurant, flying horse, movie houses, etc., at Capitol Park, here. About 300,000.

Disposal Plant—Rochester, N. Y.—City plans to build large garbage and sewage disposal plant.

Monument, Nanticoke, Pa.—City plans to build memorial monument 40 ft. high, 25 x 25 ft., marble and granite, concrete base, on Main St. About $15,000. Architect not selected.

Park Shelter and Pavilion—Lansing Mich.—City plans to build 1 story, 60 x 100 ft. park shelter and pavilion, rein.-con., steel and frame, rein.-con. flooring, steel roof trusses. About $20,000. J. N. Churchill, 514 Oakland Bldg., archt.

Dock—Muskegon, Mich.—Standard Oil Co., Park and Laketon Aves., plans to build piling, timber and concrete dock on Muskegon Lake, with warehouse and pipe lines to railways. About $100,000.

Machinery—Racine, Wis.—Racine Co. appropriated $1000 to purchase road machinery. W. O. Thomas, co. highway comr.

Machinery—Rhinelander, Wis.—Oneida Co. appropriated $15,000 to purchase additional road machinery. F. E. Parker, comr.

Conduit—Sheboygan, Wis.—Citizens Telephone Co., 8th St., plans to build additional conduit and serial cables. About $85,000. Private plans.

Road Machinery—Sheboygan, Wis.—Sheboygan Co. appropriated $6500 to purchase road machinery, to include patrol graders and tools for 15 patrolmen, machinery for county repair shop and gravel screening machinery. G. W. Ubbelohde, comr.

Cement, etc.—Phoenix, Ariz.—City rejected bids furnishing cement, sand, gravel and crushed rock for highways to be paved under $4,000,000 bond issue.

Stadium — Seattle, Wash. — Association Student Body of University of Washington plans to build 1st unit of concrete stadium. Cost, $60,000. Ultimate cost, $400,000.

Tanks—Seattle, Wash.—Genl. Petroleum Co., White Bldg., plans to build 3 steel tanks, 30 ft. high, 113 ft. diameter, concrete foundations. About $90,000.

Dock—Marshfield, Ore.—Port of Coos Bay Comn. having preliminary plans prepared for building water and rail terminal dock and purchase of suction dredge for dredging inlet and main channels. About $250,000. Election soon to vote on bonds for project. J. Polhemus, Marshfield, engr.

Rock Crusher—Portland, Ore.—Comrs. Multnomah Co. plan to install 1 gyratory rock crusher, 150 yd. crusher run rock capacity in 8 hours, to vary evenly in size from screenings to 3 in. largest diameter, at Kelly Butte. Cost to exceed $1000. R. W. Hoyt, chn.

Developing Mining Property — Rogue River, Ore.—Bolan Creek Mining Co. plans to develop mining property on upper Sucker Creek, consisting of 2 mi. creek bed; also install giants and build 3 mi. flume taking water from Sucker Creek near mouth of Boloh Creek, furnishing 400 ft. head flume involving 1,000,000 ft. lumber. About $5000. S. J. Summy, operator.

Trucks, etc.—Salem, Ore.—Marion Co. soon lets contract furnishing 1 or more 3½ ton capacity trucks equipped for hauling gravel, to be delivered by Apr. 1, also 1 factory made paving plant and 1 assembled paving plant, capacity not less than 1250 sq.yd. of 2 in. asphaltic top per day. U. G. Boyer, clk.

Police and Fire Alarm Systems—Calexico, Cal.—City voted $11,000 bonds to install police and fire alarm systems. P. B. Steintorf, city clk.

Canal and Dam — Mendota, Cal. — Mendota Irrigation Dist. plans to build 22 mi. canal and wooden diversion dam to irrigate 87,000 acres. About $500,000. Address E. P. Mitchell, Mendota.

Dams and Tunnel—San Andreas, Cal.—R. W. Olmstead, Manteca, plans to build 2 dams in Littlejohn's and Black creeks, 120 and 130 ft. high, loose rock faced with concrete, ½ mi. tunnel and power plant, here. About $2,000,000.

Bulkhead and Pier—San Diego, Cal.—City voted $250,000 bonds to build concrete bulkhead and filled-in-pier. F. Rhodes, city engr.

Fire Alarm System—San Leandro, Cal.—City plans election to vote on $14,000 bonds to install fire alarm system.

Hydro Electric System—Chatham, Ont.—Pub. Utilities Comn. plans to build extensions to system. About $90,000. J. S. Jackson, Chatham, engr.

Gasholder-Guelph, Ont.—City election in January to vote on $75,000 bonds to build steel gasholder, concrete foundation. F. McArthur, city engr.

Hydro System—Havelock, Ont.—Town Council having plans prepared by Ontario Hydro Comm., Toronto, for Hydro system. Election Jan. 5 to vote on $29,000 bonds for project. J. W. Bryans, clk.

Rink and Stadium—Kingston, Ont.—Queens University plans to build wood, steel, concrete and brick, concrete foundation. About $70,000. Engineer not selected.

Hydro Power System—Uxbridge, Ont.—Town election Jan. 5, to vote on $30,000 bonds to build hydro power system. About $30,000. A. Sler, Ontario Hydro Bldg., Toronto, engr.

BIDS DESIRED

Water Gate Boxes and Covers, Sewer Manhole Frames and Covers—Jersey City, N. J.—Until Dec. 30, by F. A. Dolan, city clk., furnishing and delivering 20 tons water gate boxes and covers and sewer manhole frames and covers.

Asphalt, etc.—Jackson, Miss.—Until Jan. 6, by city, for 300 tons asphalt and asphalt plant. M. L. Culley, engr.

Cranes, etc.—Detroit, Mich.—Until Dec. 29, by J. A. Martin, c/o Dept. Purchases & Supplies. Municipal Courts Bldg., furnishing two 20-ton locomotive cranes. Separate proposals on 3446 lin.ft. 80-lb. rail, 4 switches, 7 frogs, track spikes, etc.

Stone Crusher—New Ulm, Minn.—City Council receiving bids furnishing stone crusher. W. Backer, city clk.

Engines—Stockton, Cal.—Until Jan. 6, by Bd. Supervs. San Joaquin Co. furnishing one 75 h.p. and one 25 h.p. vertical or horizontal oil engine at county farm. E. D. Graham, clk.

Survey Monuments—Toronto, Ont.—Until Jan. 15, by Dept. Lands, Forests & Mines, Surveys Branch, Toronto, furnishing 2500 survey posts, of 1 in. w.i. pipe, 30 in. long, welded foot plate and cement filled. L. V. Rorke, Parliament Bldgs., Toronto, engr.

Pipe, etc.—York, Ont.—Until Jan. 17 by F. Barber, twp. engr., 40 Jarvis St., Toronto, furnishing 5000 lengths 6 in., 1000 lengths 12 in., and 1000 lengths 16 in., c.i. pipe; 500 tons, 6, 12 and 16 in. c.i. specials; 200 6 in., 30 12 in. and 20 16 in. gate valves; 250 hydrants and 250 round c.i. valve covers and frames. About $225,000.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

★**Pier—Curtis Bay, Md.** (Baltimore, P. O.)—Standard Guano Wks., 1214 Continental Bldg. Baltimore, let contract building 40 x 200 ft., wood pile and timber pier, at plant, here, to Whiting-Turner Co., Stewart Bldg., Baltimore. About $50,000.

★**Condensing Apparatus and Turbine Generator—Ashtabula, O.**—City Council let contract furnishing condensing apparatus for electric lighting plant, to Wheeler Condensing & Eng. Co., Oliver Bldg., Pittsburgh, cost $13,940; turbine generator, to Kerr Turbine Co., Wellsville, N. Y., $23,800.

★**Retaining Wall, Fence and Flag Pole—Cleveland, O.**—Bd. Educ. let contract building concrete retaining wall, 1200 ft. long, 4 ft. high and 12 in. thick, also iron fence, 200 ft. long, and flag pole, involving 3000 cu.yd. excav., at Gladstone Public School grounds, to C. N. Griffen, 5709 Euclid Ave., $23,591.

★**Water Pipe—Dayton, O.**—City let contract furnishing 1250 tons c. i. water mains, various sizes, to United States Cast Iron Pipe & Fdry. Co., 122 South Michigan Ave., Chicago, $80,322.

★**Structural Steel—Lansing, Mich.**—Atlas Drop Forge Co., 209 West Mt. Hope Ave., let contract furnishing structural steel for 150 ft. extension to steel plant and steel storage yard, also for equipment, to include 3 heavy trip hammers, 300 h.p. boiler, and traveling crane, to Wisconsin Bridge & Iron Co., Penobscot Bldg., Detroit.

★**Water and Electric Equipment—Aitkin, Minn.**—City let contract furnishing water and electric equipment, to J. G. Robertson, Wabash and Eustis Sts., St. Paul, $9489.

★**Foundation—Hibbing, Minn.**—Bd. Educ. let contract excavating and building concrete foundation for 2 story, 385 x 400 ft., rein.-con. and brick school, in Central Division, to Swanson Contg. Co., Hibbing, $89,750.

★**Grain Elevator—Kansas City, Mo.**—Chicago, Burlington & Quincy R. R., 547 West Jackson Blvd., Chicago, let contract rebuilding rein.-con. elevator, here, to Burrell Eng. & Constr. Co., 327 La Salle St., Chicago. About $400,000.

★**Water Mains—Bellingham, Wash.**—City let contract furnishing c.i. water mains to be used along West Diagonal Rd., to Oregon Iron & Steel Co., Concord Bldg., Portland, cost $78.50 per ton. Total cost exceeds $5000.

Retaining Wall—San Francisco, Cal.—Bd. Pub. Serv. received bids building 1736 ft. retaining wall on Army St. from Evans Ave. to Iowa St., involving 1500 cu.yd. earth excav., 25,200 sq.yd. mass concrete and 52 tons reinforcing bars, from Healy & Tibbetts, 9 Main St., $40,257, A. H. Vogt, 185 Stevenson St., $43,837, Anderson & Ringrose, 320 Market St., $44,904.

OFFICIAL PROPOSALS

Bids: Jan. 6.

Road Construction

Williamson, W. Va.

Sealed proposals will be received by the Clerk of the County Court of Mingo County, West Virginia, until 2 o'clock p. m. on the 6th day of January, 1920, for the construction of the following section of road, to-wit:

A section of road on Pigeon Creek in said County, beginning at the intersection of road No. 4 (Williamson-Burch Road) with road No. 10, at the mouth of Little Buffalo Creek on said Pigeon Creek, thence up Pigeon Creek according to location of road made by L. C. Linkous, County Road Engineer, to station 264, about one mile above the residence of E. E. Musick on said Creek, making a total distance of about 8 miles.

Plans, specifications and estimates of quantities may be examined at the County Road Engineer's Office, Williamson, W. Va., at the Division Road Engineer's Office, Huntington, W. Va., and at the office of the State Road Commission, Charleston, W. Va.

Proposals will be received only on the standard State forms prepared by the State Road Commission, which may be obtained from the Division Engineer's Office, Huntington, W. Va.

A certified check of not less than Fifteen Hundred Dollars ($1500.00), payable to G. T. Blankenship, Sheriff, must accompany each proposal.

The right is reserved to reject any and all bids.

THE COUNTY COURT OF MINGO COUNTY,
By ALEX BISHOP, President
Attest: ELIHU BOGGS, Clerk.
Dated this 5th day of December, 1919.

Note by Engineer:

The undersigned hereby designates January 2nd and 3rd as the days upon which he will accompany the contractors or their representatives over the proposed section of road.

L. C. LINKOUS,
County Road Engineer.

Bids: Jan. 27.

Construction of Steel Water Towers and Tanks

Avoca, Iowa.

Sealed proposals will be received by the Town of Avoca, Iowa, until 8:00 o'clock P.M. on the 27th day of January, 1920, for furnishing all materials, labor and tools required in the construction of (1) a steel water tower and wood tank complete, (2) a steel water tower and steel tank complete and (3) a concrete water tower and tank complete, each tower and tank to be about 105 feet high and 100,000 gallons capacity and in accordance with plans and specifications now on file in the office of the Clerk of said Town. Copies of "Instructions, Bidding Blank, Specifications, Plans and Contract" may be obtained from the Town Clerk.

FRANK WISE,
Clerk.

Bids: Feb. 1.

Drawings for City Auditorium

City of Mitchell, S. D.

The City Council of the City of Mitchell are desirous of receiving Drawings for a City Auditorium, to cost approximately $150,000. Three prizes are offered for the best designs submitted, ($450, $300, and $150).

The program governing competition, together with Plat of site and full instructions, will be sent on request by the undersigned.

All drawings, to receive judgment and consideration, must be at the Office of the undersigned by February 1st, 1920.

THOMAS EASTCOTT,
City Auditor.

Bids: Jan. 9.

Constructing 48-Inch Force Main

CITY OF AKRON, OHIO,
DEPARTMENT OF PUBLIC SERVICE
WATERWORKS IMPROVEMENT
Contract No. 164.

Akron, Ohio.

Sealed proposals for constructing a 48-inch pipe line will be received at the Office of the Director of Public Service, Delaware Building, Akron, Ohio, until twelve o'clock noon, Central Standard time, of Friday, the ninth day of January, 1920, at which time and place they will be publicly opened and read.

The contract includes the furnishing and laying of approximately 4.1 miles of pipe line, together with appurtenances, between the Cuyahoga River Pumping Station and the crossing of the Cuyahoga River south of Kent.

Alternative bids will be received as follows:

Bid "A": Furnishing pipe and special castings for a 48-inch cast iron line.

Bid "B": Laying 48-inch cast iron line.

Bid "C": Furnishing and laying 48-inch lock bar steel pipe.

Bid "D": Furnishing and laying 50-inch riveted steel pipe.

All proposals must be made on the forms furnished by the City.

Each bidder must accompany his proposal with a satisfactory bond or certified check in the sum of Fifteen Thousand Dollars ($15,000.00).

A surety bond in the amount of fifty (50) per cent of the amount of the contract will be required of the successful bidder.

Plans and specifications may be seen at the office of the Director, or copies may be obtained from the Bureau of Water Works Improvement, 102 E. Mill St., Akron, Ohio, upon deposit of Ten Dollars ($10.00), which sum will be refunded on return of the plans and specifications in good condition within ten days after the award of the contract.

The right is reserved to reject any or all bids.

H. S. MORSE,
Director, of Public Service.
G. G. DIXON, Engineer.
H. H. FROST, Supt. Water Works.

Bids: Jan. 20.

Waterworks Improvements

Lexington, N. C.

Sealed proposals will be received by the Mayor and Board of Town Commissioners of the Town of Lexington, N. C., at the Town Hall in Lexington, N. C., until 4 p.m., Jan. 20, 1920, for waterworks improvements.

The work will consist of the following:

Brick and concrete pumping station, filter house and filter tubs.

Brick and concrete auxiliary station.

Concrete coagulating basin.

Concrete storage reservoir, 500,000 gal.

Three and one-half miles of cast-iron pipe line.

Three and one-half miles of 2200-volt transmission line.

Motor-driven centrifugal pumps and accessories.

Filter plant equipment.

Proposals must be marked, "Proposal for Waterworks Improvements."

All bids must be upon the blank forms provided in, "Proposal, Specifications and Contracts."

Each bid must be accompanied by a certified check for not less than 5% of the amount of the bid, as evidence of good faith.

Plans and specifications will be on file at the Clerk's Office in Lexington, and at the Office of the Engineer, in Durham, N. C., and copies of the specifications, form of proposal, etc., will be mailed upon application to the Engineer at Durham, N. C.

The right is reserved to reject any or all bids.

J. T. HEDRICK, Mayor.
Engineer: J. V. MOFFIT, Clerk.
GILBERT C. WHITE,
Durham, N. C.

Bids: Jan. 5.

Paving

Fayetteville, W. Va.

Sealed proposals will be received at the office of the Clerk of the County Court, Fayetteville, W. Va., until January 5th, 1920, for paving one section of the Midland Trail, through Nuttall District, of approximately 8.0 miles. Grading and drainage complete. Bids will be received on Portland Cement Concrete, Bituminous Macadam (Penetration) and other improved types of paving.

Bids must be submitted on the blank form contained in the book of specifications, which with other information may be obtained upon application to J. K. McGrath, Road Engineer, Fayetteville, West Virginia.

A certified check for five per cent. of the proposal, made payable to the Sheriff of Fayette County, shall be filed with the bid. The County Court reserves the right to reject any and all bids.

J. K. McGRATH, Road Engineer.
By order of the County Court of Fayette County, West Virginia.
H. O. BOLEY President.
Dec. 10, 1919. C. E. MAHAN, Clerk.